

# ROADS AND STREETS

JANUARY 1947

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DETROIT

*Something to marvel  
at, Old Timer!*



If some of the old-time construction contractors of the horse-and-scoop era of dirt moving could see massive modern dirt moving equipment doing its daily stint they'd surely marvel at it—and with reason.

And yet, today, thanks to machines like these big LeTourneau Tournapulls rolling smoothly along on their Timken Roller Bearings, moving a million and a half yards of earth is just another job.

The photograph was taken high up in the Colorado Mountains (altitude 8200 feet) where 1,500,000 yards of clay and gravel are being poured into Granby Dikes, a link in the Colorado Big Thompson River Dam Project.

Contractor L. J. Hesser is using 8 Tournapulls. Work was begun in the spring of 1946 and the earth-moving job is scheduled for completion late in 1948.

To make sure of getting tapered roller bearing advantages in full, look for the trade-mark "TIMKEN" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

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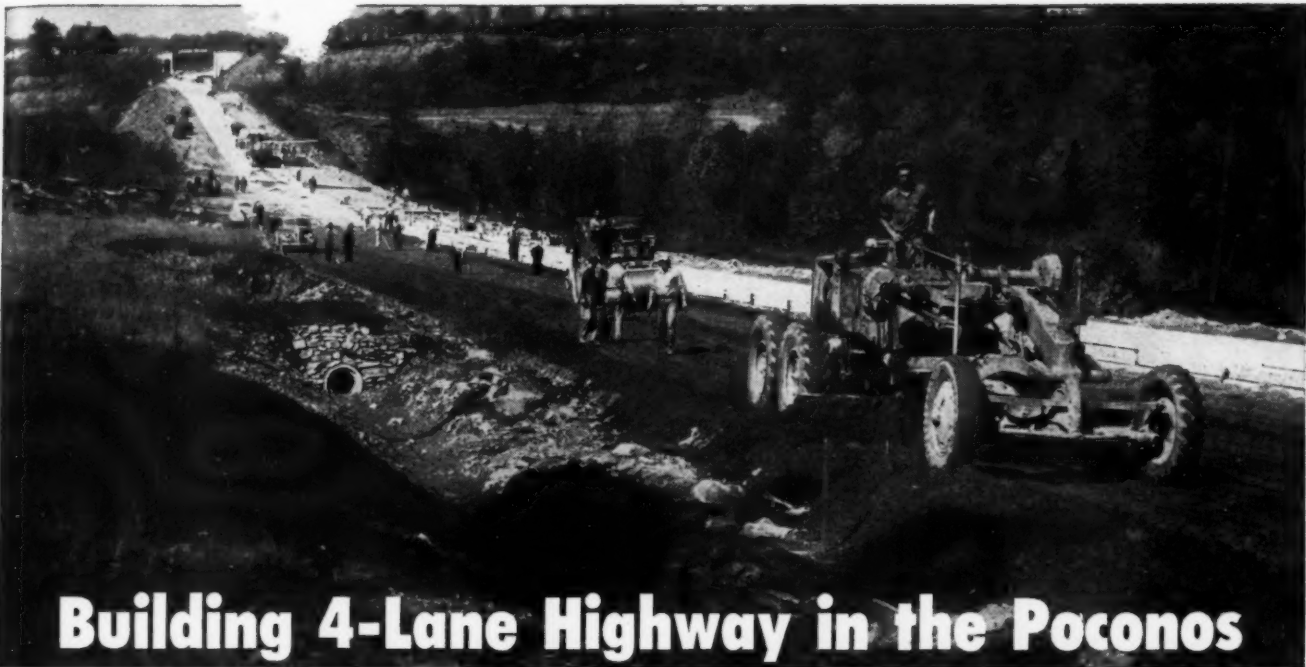
BETH

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## Building 4-Lane Highway in the Poconos

Looking north toward Mt. Pocono. Scraper (foreground) smooths road bed. Bethlehem hinged bar mats and road joints are being used in paving operations (background).



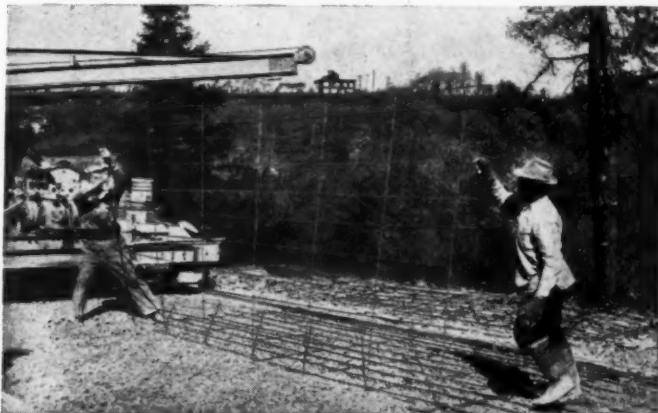
Bethlehem reinforcing bars help provide strength for this 166 ft culvert, located near southern end of new road.

← C. W. Good, General Contractor appears at the left. At the center is M. E. Boogar, district construction engineer, and at the right C. M. Benz, resident engineer, both of the Pennsylvania Department of Highways.



An example of Bethlehem's dependable steel service to contractors . . . Bethlehem hinged bar mats arrive at the job, ready for use.

Below: Bethlehem hinged bar mat goes into place over a 7-in. concrete fill. Note ease with which bar mat is handled by two men.



These on-the-job photographs were taken during construction of a 4-lane highway in the Poconos, between Tannersville and Mt. Pocono, Pa. Built to replace a winding, outmoded road, this 5.7-mile stretch of highway is part of U. S. 611—express route from Philadelphia to Scranton and the north.

In addition to more than 139,000 sq yd of pavement, the job includes three bridges, three culverts, one arch, and one arch-extension—all of reinforced-concrete construction. C. W. Good, of Lancaster, Pa., is the general contractor.

Hinged bar mats, bridge reinforcing, road joints, guard rail and posts were supplied by Bethlehem.

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# ROADS AND STREETS

With Roads and Streets Have Been Combined  
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## In This Issue

### Coming Articles

#### Annual Summary and Forecast of State Highway Construction

This yearly *Roads and Streets* feature gives '46 expenditures, and mileages by road types, and budget plans for '47

#### Moving Million Cubic Yards a Month

How an 80-wagon fleet has averaged 45,000 c.y. daily on a 4-mile haul at San Francisco's new airport

#### Trends in Highway Bridge Design

By Raymond Archibald, Chief, Bridge Division, Public Roads Administration

Broad advancements in design have been made, promising greater structural and traffic safety and improved appearance in tomorrow's thousands of new bridges and grade separations

#### Bronx-Whitestone Bridge Repairs

New stiffening trusses and other details of work done recently on this bridge in New York City area

#### Pavement Striping Methods

Nation-wide symposium on problems and methods of application

#### Winter and Spring Maintenance Begins in Autumn

How several Michigan Counties do autumn graveling; notes on sanding, plowing and other winter maintenance

#### Highway Officials Meeting

Notes on the recent annual AASHO meeting at Los Angeles

#### Also coming: Rubberized asphalt joint filling methods at Packard test track.

... California's 2-way radio. ... Curing slides with drainage tunnels. ... Survey of embankment compaction specifications. ... Notes on shoulder maintenance. ... Other timely topics.

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A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

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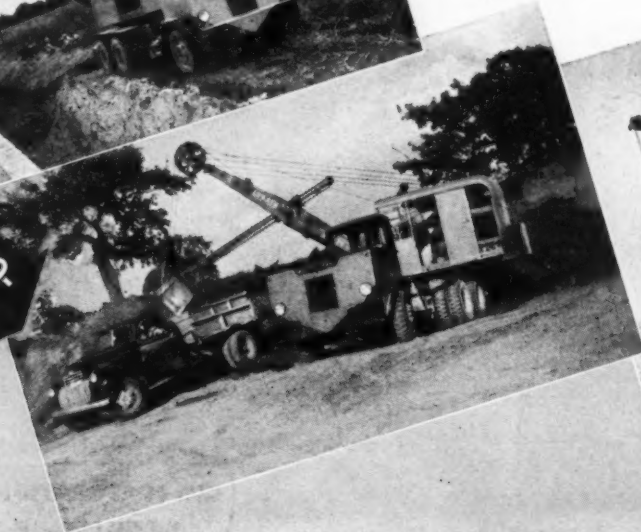
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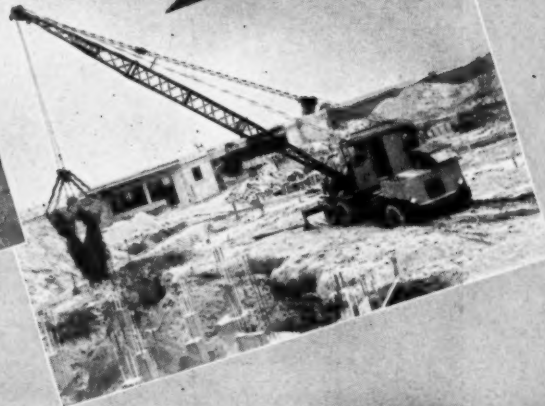
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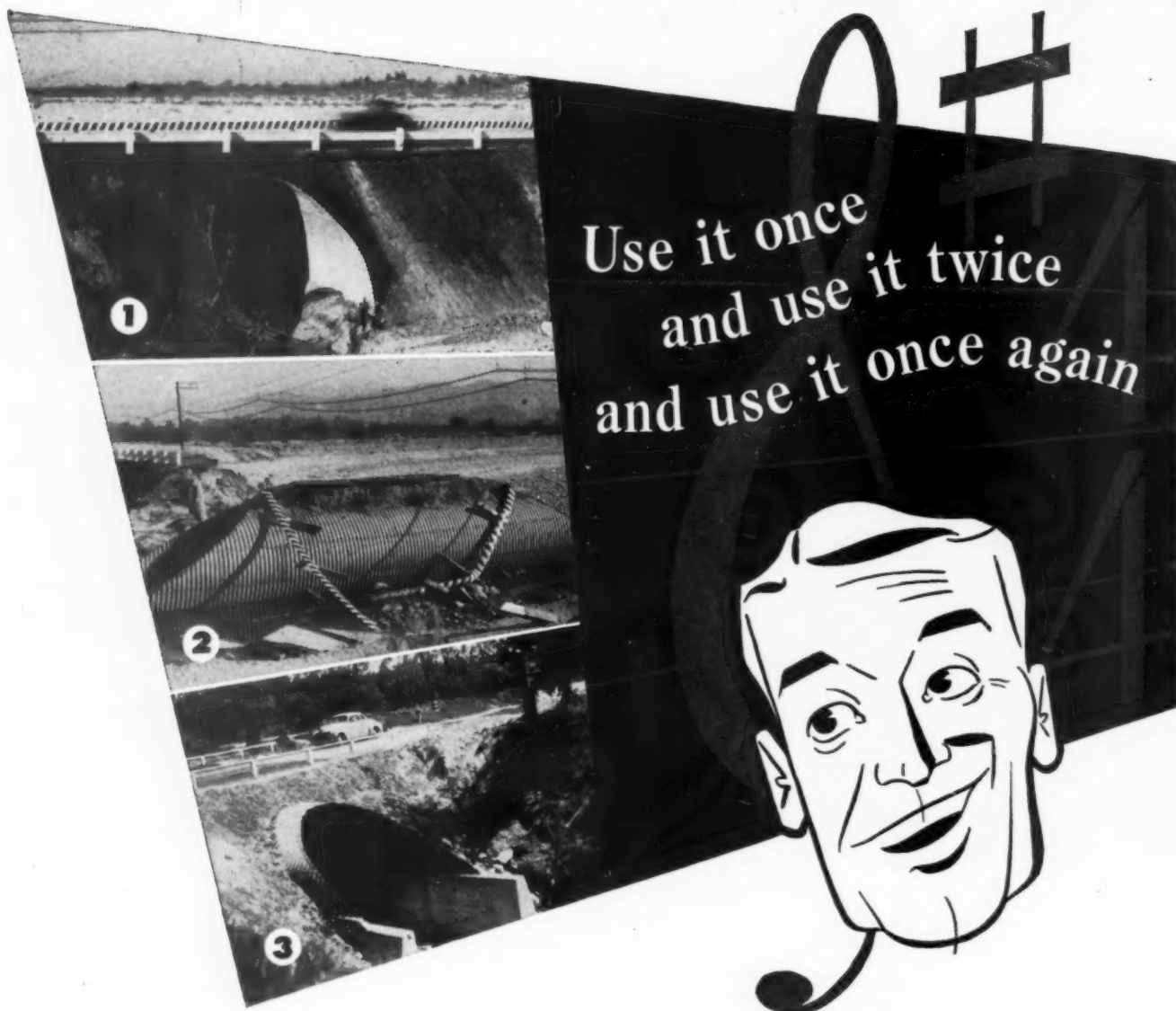


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**2** This is what happened when a sudden flood washed out the road. The ARMCO Multi Plate structure was intact but was replaced by a bridge with greater flood capacity.

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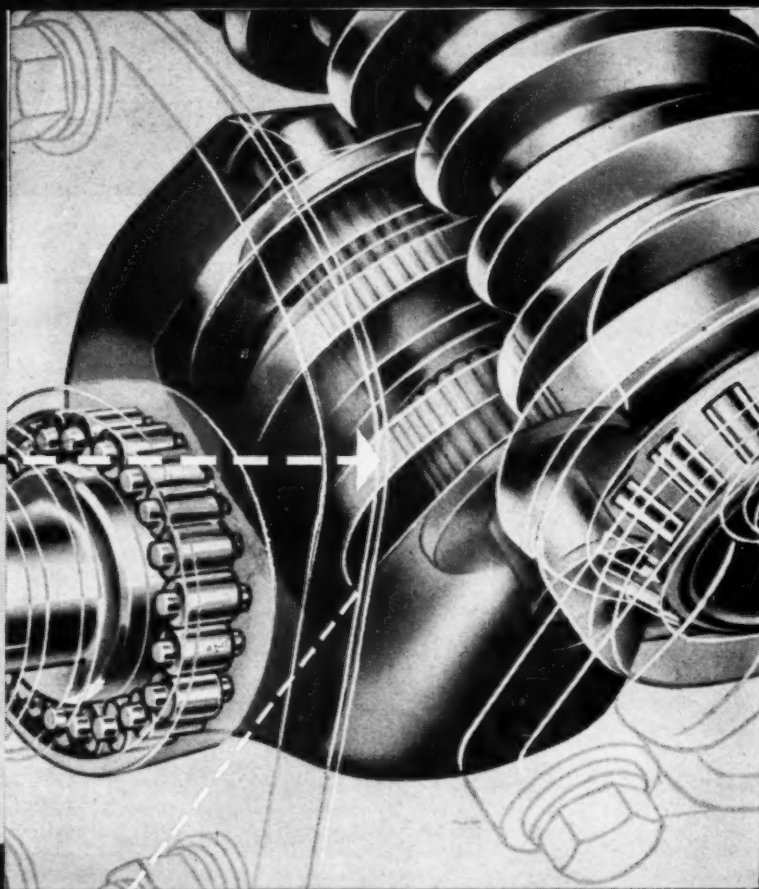
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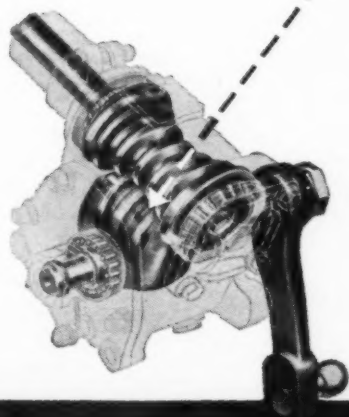


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CUT WITHIN 10" of fences, trees, buildings, with Parsons Ladder Trenchliner (221 illustrated). Off-set boom, shiftable across the full width, lets Trenchliner side-step obstructions.



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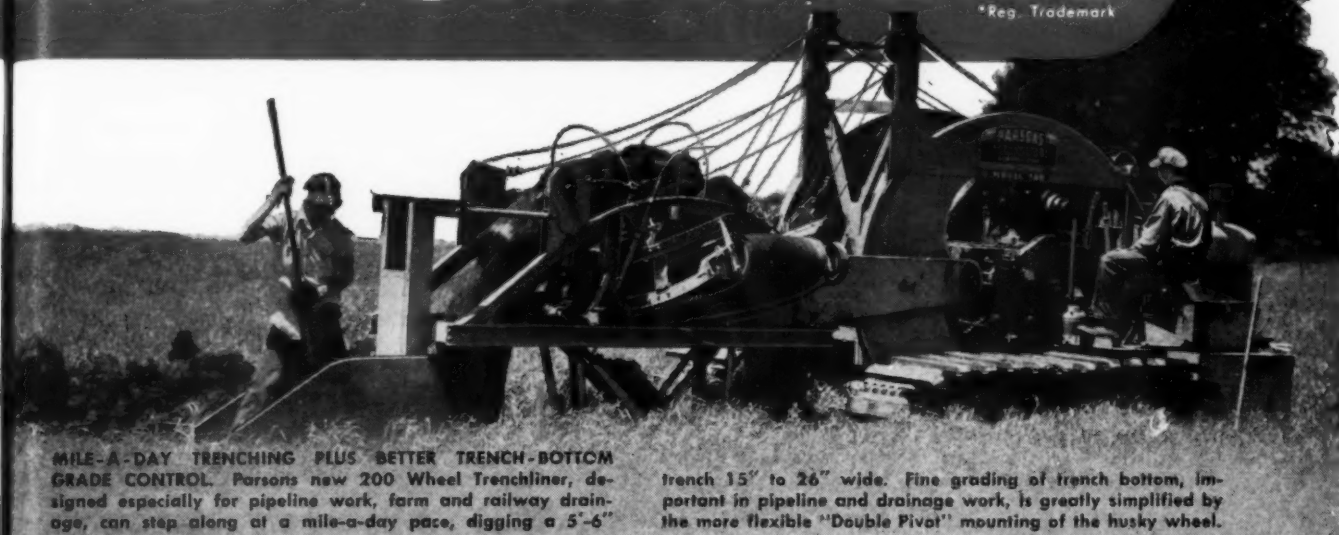


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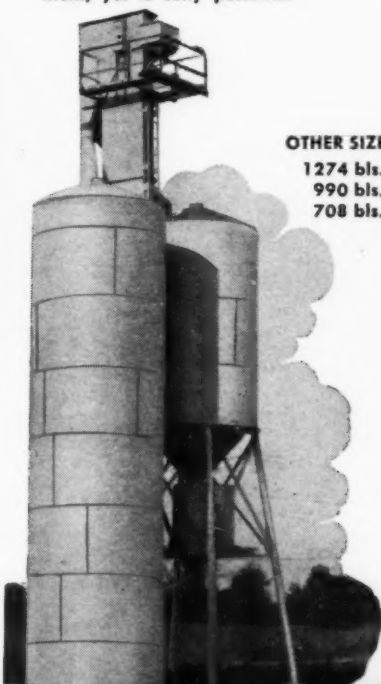
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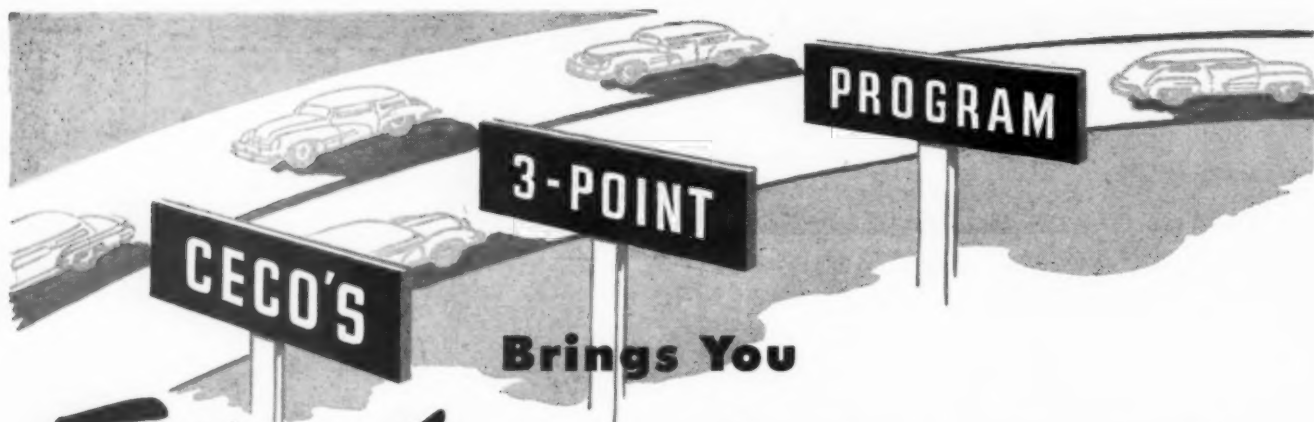
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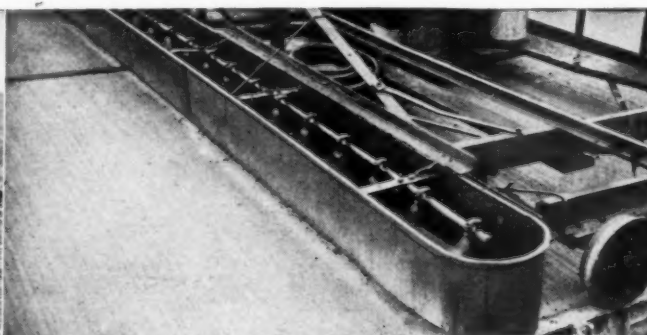
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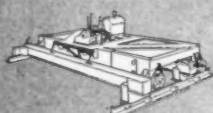
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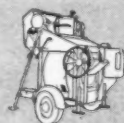
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# *Your Best Bet* ✓

## INTERNATIONAL Diesel Crawlers

● "This is an easy job for my International," said W. H. Kamp of Des Moines, Washington. He was removing and piling large stumps at Skyway Park, a housing project southeast of Seattle.

International Diesel Crawlers have the power, ground contact, hang-on and weight distribution that makes them ideal for this work. They clear land economically with bulldozers or special clearing dozers—and do it fast!

For evidence of the durability and matchless operating economy of these powerful crawlers, look at Mr. Kamp's TD-18. *It is 4½ years old, has given almost 10,000 hours of trouble-free performance and still has not had the pan off!* In that time it has yarded logs—hauling 25,000 board feet per day on 45% grades—and has done plenty of earth moving. At Skyway Park it built 7,000 feet of streets in 20 days of extremely wet Washington winter. This included opening up and clearing the land. Some stumps removed were ten feet in diameter and some of the rocks weighed as much as five tons. "This

machine is just as true today as a new machine", says Mr. Kamp. "It is not sprung in the least and has never been off the tracks once. It has plenty of power. In fact, I do



Mr. Kamp gets a big stump moving with his TD-18 and bulldozer. Note how the International's oscillating tracks keep the crawler poised to follow through.

jobs like this with the throttle only ¾ open."

For economical, dependable working horsepower you'll find International Diesel Crawlers your best bet. Ask the International Industrial Power Distributor near you for all the facts on current and forthcoming models.

Industrial Power Division

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# INTERNATIONAL



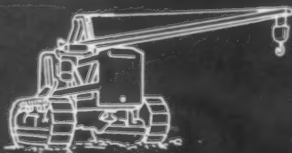


# *for Land Clearing*

Roots out of the ground and pointed skyward. The International Diesel, under Mr. Kamp's experienced hand, rivals Paul Bunyan in stump removal. In two more minutes the stump's in the pile for burning.



## ***Industrial Power***





# America's finest Highways are reinforced with **TRUSCON WELDED STEEL FABRIC**

Everywhere across the country—up in the mountains, down in the valleys, along the seaside—mile after mile of America's finest concrete highways are reinforced with Truscon Welded Steel Fabric.

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**Provides resistance to cracking due to shrinkage of concrete during setting period.**

**Provides tensile strength necessary to resist subgrade friction caused by expansion and contraction of the concrete slab.**

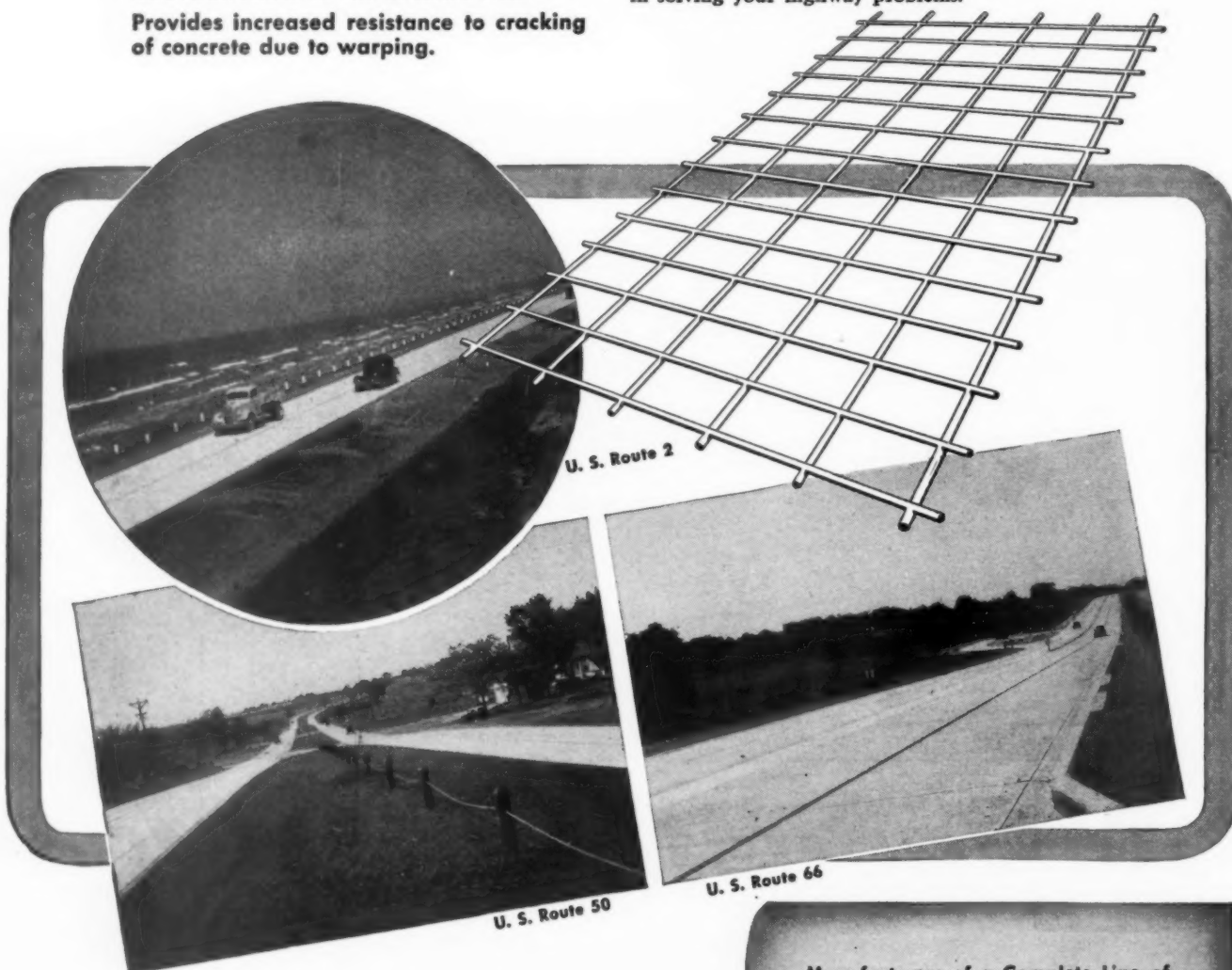
**Provides increased resistance to cracking of concrete due to warping.**

**Provides resistance to the development of microscopic cracks into visible cracks.**

**Provides resistance to cracks opening and allowing entrance of water.**

**Provides resistance to broken ends of slabs separating at a crack.**

For strong, durable highways, plan to use Truscon Welded Steel Fabric and associated road building products. That way you can be sure of smooth, durable roads which will better serve your community and increase your prestige. An experienced Truscon highway engineer will be glad to assist you in solving your highway problems.



## TRUSCON STEEL COMPANY

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## WHO IS HE?

When a business succeeds, it usually grows. This growth calls for a more complex system of management and, often, more widespread ownership.

Take a company like Allis-Chalmers, which has grown and progressed for 100 years. Just who is Mr. A-C? Because the answer to a question like that is complex, it is easy for people to pick up mistaken impressions.

For the sake of the record, let's take Mr. A-C apart and see who he really is.

## WHO IS CAPITAL?

Capital doesn't wear a silk hat at Allis-Chalmers. "Capital" consists of 23,100 stockholders who own an average of less than 110 shares each. Mr. Capital might be a grocer, a farmer, a widow, a school teacher, or YOU. He might be a company employee in the office or shop or an officer of the company.

**No one individual or family owns more than 1/2 of 1 percent of the total stock of Allis-Chalmers.** This is an example of democratic ownership distinctive in the history of large corporations.



## WHO IS MANAGEMENT?

Management is the guiding hand (or head) hired by the owners to make an organization tick — and click! Management coordinates the efforts of individuals and sets the direction the company travels.

Who is Mr. Management at Allis-Chalmers? Not just the officers and division heads of the company. Management is the salesman in the territory, the foreman in the shop.

**Management is every employee from errand boy to president who contributes by word and deed to the progress of the company.**

Speaking of errand boys, two of the top officers of Allis-Chalmers started with that job. Two others started as salesmen in the field. Two others as student engineers. All Allis-Chalmers officers know the business from the ground up — through experience with the company.

Mr. Management doesn't wear a high wing collar at Allis-Chalmers. Neither does he have any monopoly on his job.



## WHO IS LABOR?

The man who works in the shop is spoken of in the newspaper as "labor." Actually, he may be a skilled craftsman, as much a master of his trade as a dentist or a surgeon.

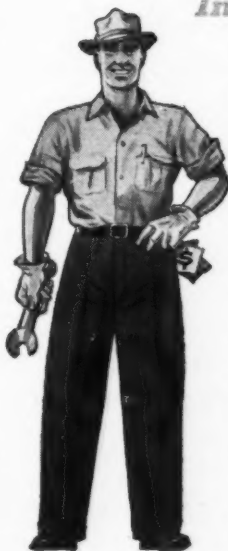
Actually he may be a part of Management by reason of some suggestion he has made to improve a process or a product.

Actually he may be a part of Capital through ownership of company stock.

The fact that he works with his hands makes him no less a part of Allis-Chalmers than the man or woman who works at a desk. The terms "Capital," "Management," and "Labor" are indefinite and overlapping. Many a man who works in the shop is actually a part of all three groups.



## Introducing Mr.



Who then is Mr. A-C? He is a combination of 23,100 stockholders, 25,000 employees, nearly 5,000 dealers and their employees, and more than 10,000 suppliers who furnish in excess of 100,000 separate items for manufacture.

He symbolizes a company in which no individual or family owns more than 1/2 of 1 percent of total stock.

His is a company which contributes something to better living in nearly every home in America — in supplying machines to grow and process food, generate electricity, pump water, build roads, produce building materials.

Quite somebody, Mr. A-C! A potent contributor to the welfare and livelihood of millions of people. It takes the right hand, left hand, head,

heart and pocketbook to achieve such results. No one part of him can do the job alone.

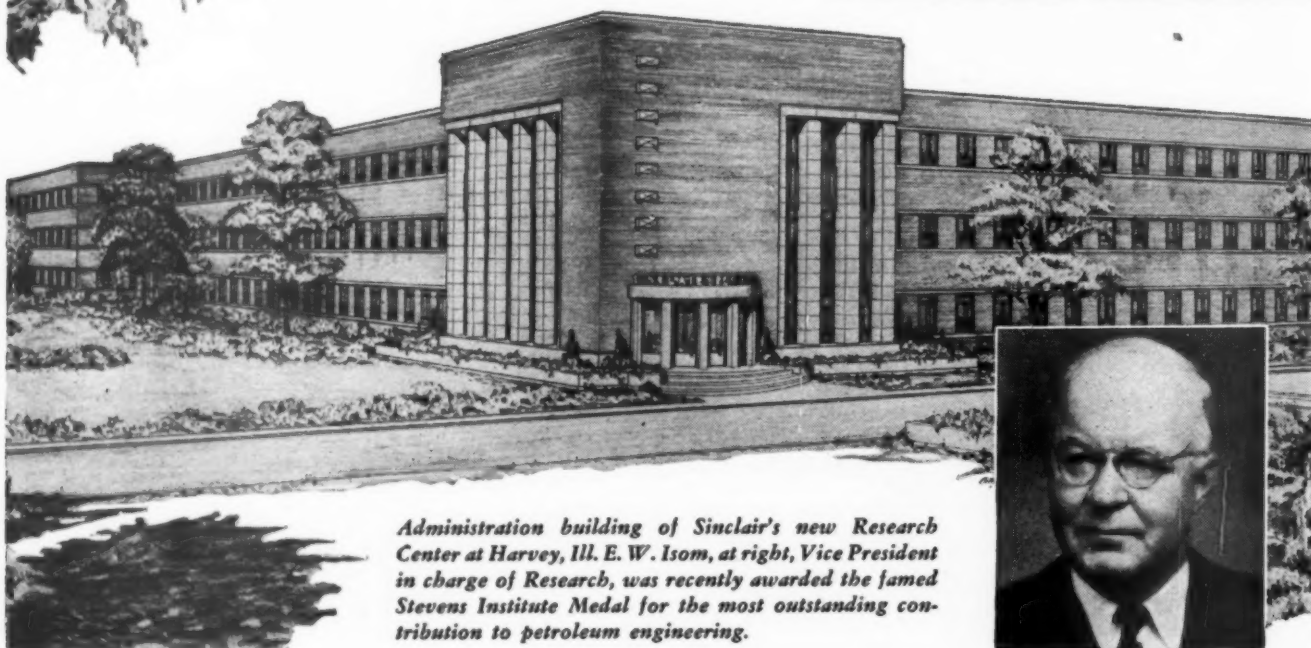
# ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

2-CYCLE DIESEL CRAWLER TRACTORS • MOTOR GRADERS  
POWER UNITS • INDUSTRIAL WHEEL TRACTORS

# Outstanding Ability

... to solve your lubrication problems



Administration building of Sinclair's new Research Center at Harvey, Ill. E. W. Isom, at right, Vice President in charge of Research, was recently awarded the famed Stevens Institute Medal for the most outstanding contribution to petroleum engineering.

Sinclair is completing a new \$4,000,000 petroleum research and development laboratory at Harvey, Ill. This great research center — to be the most modern and best equipped in the industry — climaxes more than 30 years of consistent achievement in the development of superior products for the solution of your most difficult lubrication problems.

The outstanding skill and vast technical knowledge of recognized experts in the petroleum field will continue to serve you at Harvey as they have for so many years at East Chicago.

For tested, proven lubricants . . . designed by special research for specific industrial application . . . rely on Research-Wise Sinclair.

## *Sinclair Automotive Lubricants*

For Engines:

**OPALINE MOTOR OIL**  
**OPALINE TBT MOTOR OIL**

(For severe service)

**TENOL** (Heavy Duty — For Diesels)

For Gears:

**OPALINE GEAR LUBRICANTS**

For Chassis:

**OPALINE CHASSIS LUBRICANT**

For Wheel Bearings:

**SINCOLUBE**

SINCLAIR REFINING COMPANY • 630 FIFTH AVENUE, NEW YORK 20, N. Y.

# SINCLAIR

## *Lubricants for Industry*

FINEST CRUDES + EXPERT RESEARCH

and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE



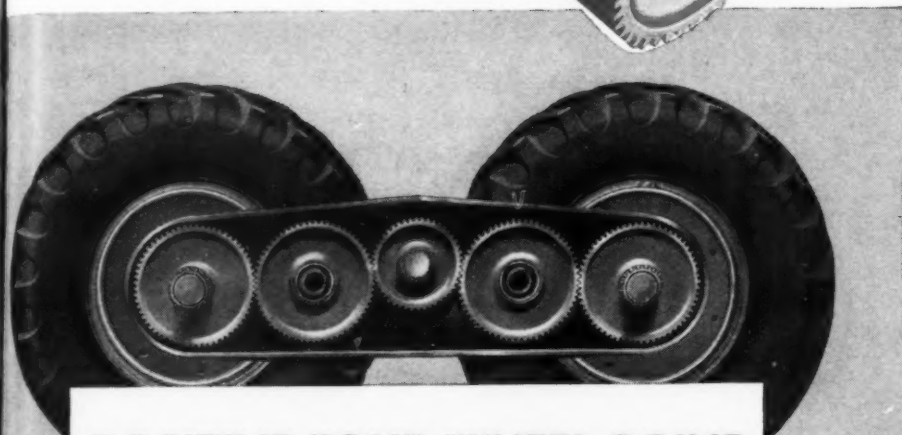
# GALION

## GEAR

## DRIVE



# Assures MAXIMUM TRACTIVE EFFORT



### POSITIVE FOUR-WHEEL DRIVE

The GALION *All-Gear* Tandem Drive is the most efficient and advanced type of drive obtainable. Power is transmitted equally to all four wheels by means of heavy accurately meshing gears which turn on anti-friction roller bearings. Gears and axles are solid, one-piece, nickel alloy steel—drop forged and heat treated for super-ruggedness.

In the GALION 102, the flow of power from engine to drive wheels is smooth, positive, and steady. The *All-Gear* Drive as used in GALION Tandem Drive Motor Graders, is always a four-wheel drive.

Catalog No. 290 gives complete information—write for a copy today, and name of nearest GALION Distributor.

**The GALION IRON WORKS & MFG. CO.**

General and Export Sales Offices  
Galion, Ohio, U.S.A.



### GALION FEATURES THAT ASSURE TOP PERFORMANCE

- Large front tires—Same size as rear.....
- Combination hand and hydraulic steering.....
- Rugged box-type main frame.....
- Gear-type, four-wheel tandem drive.....
- Full hydraulic control—low pressure system.....
- Heavy front axle construction.....
- Blade pressure of 13,500 lbs.....
- Powerful, quick-starting, full Diesel motor.....

# GALION

IRON WORKS

## hydraulic

## GRADERS · ROLLERS

DETROIT PUBLIC LIBRARY

# Easy Flow

— SAYS LITTLE JOE

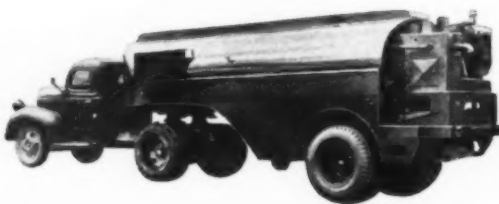


Fast, economical, efficient spraying of all kinds of asphalt and oils is what makes Littleford Spray Master Pressure Distributor so admirably adapted to big time operation. It has: (1) Instantaneous single valve control—an exclusive feature. (2) Full Circulating Vacuum-Flow Spray Bar (up to 24 feet wide) which assures even starting spray and nondrip shutoff. Vacuum-Flow system sprays all materials, from heaviest penetration asphalt to lightest road oils. (3) Heat Chamber keeps valves

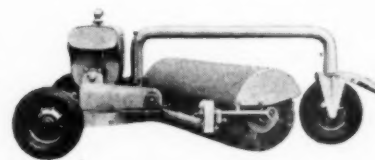
and pipe lines warm. (4) Piston Check Valves can be cut off individually, for spraying difficult widths—no removal of extensions, no use of blank plugs. (5) Atomizing Low Pressure Burner produces more heat than two Torch Burners. The Spray Master line includes many models other than the one pictured. Ask for Bulletin 14. Littleford supplementary equipment includes Tankar Heater, Road Brooms, Spray Tanks, and a variety of Maintenance Units, for making roads better.



TANKAR STEAM HEATER No. 115 is fastest steam producing unit on the market for heating tank car contents for unloading. Completely automatic, safety factors. Ask for Bulletin 21.



LITTLEFORD SUPPLY TANKS are the life line of black top jobs, supplying hot and cold materials while operating equipment works without interruption. Ask for Bulletin 25.



LITTLEFORD BROOMS are power or traction driven. Hydraulic lift regulates tension, saves brush. Can be equipped with blower or sprinkler. Ask for Bulletin 19.

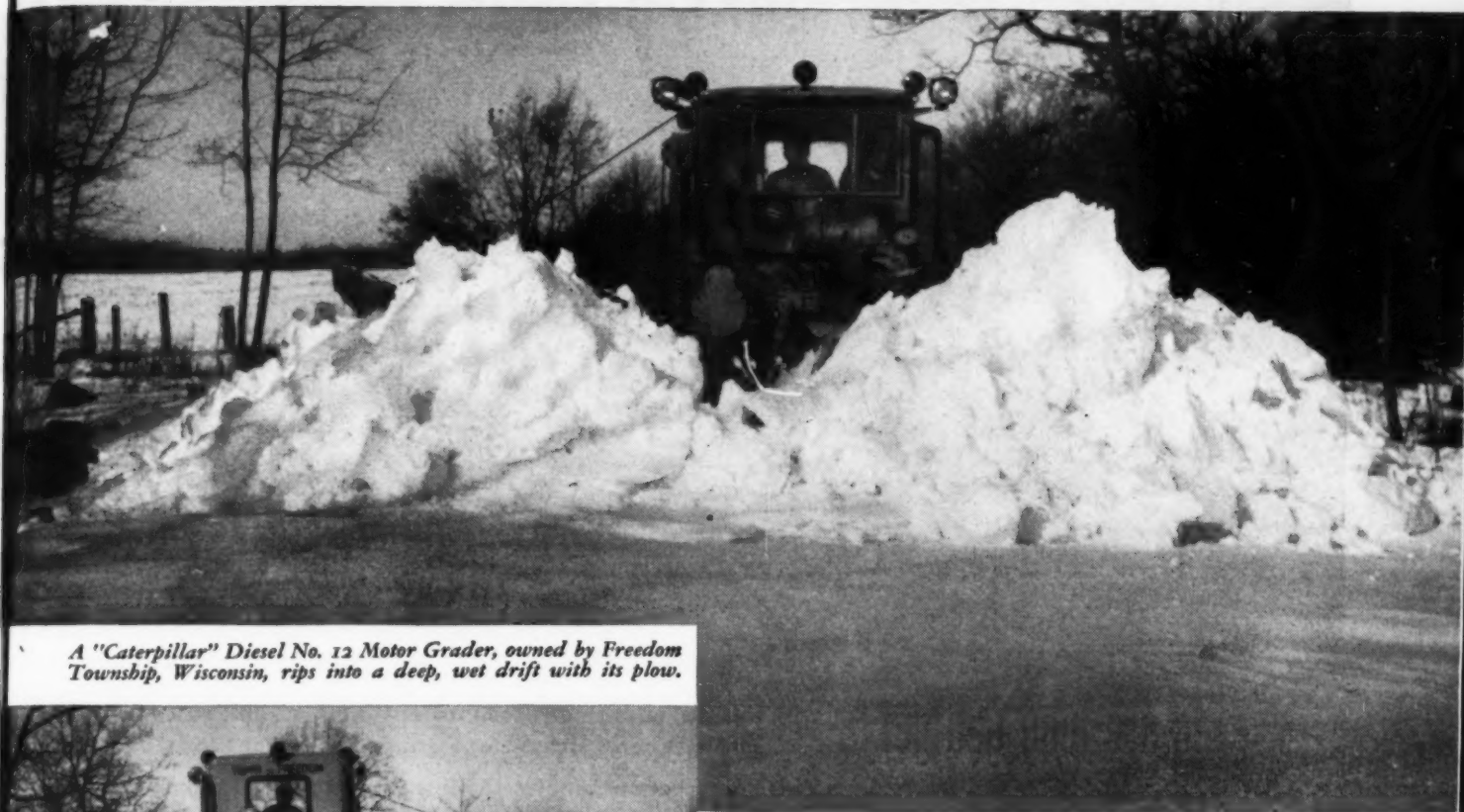


## LITTLEFORD

LITTLEFORD BROS., Inc.

454 E. PEARL ST., CINCINNATI 2, OHIO

# "OLD NO. 12" OPENS THE ROADS



*A "Caterpillar" Diesel No. 12 Motor Grader, owned by Freedom Township, Wisconsin, rips into a deep, wet drift with its plow.*



*Widening and winging back after the first cut. 48 miles of two-way road were cleared in 23 hours.*

## CATERPILLAR

REG. U.S. PAT. OFF.

## DIESEL

ENGINES • TRACTORS  
MOTOR GRADERS  
EARTHMOVING EQUIPMENT

LAST winter Freedom Township, in Wisconsin, was hit by a big storm. Heavy and wet, with drifts up to five feet deep in many places, the snow halted practically all traffic.

While the storm raged, the township's "Caterpillar" Diesel No. 12 Motor Grader, equipped with snow-plow and snow-wing, was out on the roads. In 23 hours the big machine opened 48 miles of highway to two-way traffic. The first cut was made in low gear; the widening and winging back was done in 2nd gear; and the final clean-up in 4th gear. Fuel consumption was less than 3 gallons per hour.

Many another northern town and county can tell similar stories of the snow-fighting ability of "Caterpillar" Diesel Motor Graders. "Old No. 12" is a famous name the year 'round on the country's highways.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS





• • to see why you get  
hot, dry steam faster  
with less fuel and water

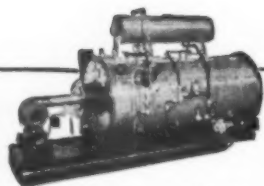
● The cross-section illustration graphically shows the famous Cleaver-Brooks four-pass down-draft construction which, with integral oil-burner, accounts for the remarkable efficiency of Cleaver-Brooks steam generating equipment.

This construction doubles the lineal gas travel, compared to ordinary two-pass boilers,—the result is unmatched high heat transfer and efficiency.

No other equipment has this original and exclusive four-pass down-draft construction—plus the perfected positive dry coil method of condensate return—that's why you get hot, dry steam faster with less fuel and water with Cleaver-Brooks equipment. Write for bulletins and complete information.

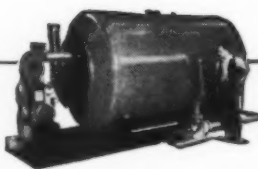
#### CLEAVER-BROOKS COMPANY

5106 N. 33rd Street • Milwaukee 9, Wisconsin



#### Automatic Steam Plants

Completely self contained; highly efficient; require only simple piping connections to place in operation. Fully automatic fuel-oil burner; condensate recovery and feed water pumping system; no stack needed, sizes from 20 to 500 h.p.; pressures 15 to 200 lbs.



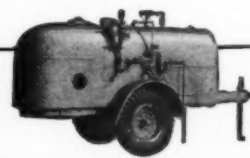
#### Hot Water Boosters

Oil-fired; fully automatic or manual operation; no licensed engineer needed; two capacity sizes: 3000 gals. storage tank for 1600 gals. of water heated 150° F. per hour; 1500 gals. storage tank for 800 gals. of water heated 150° F. per hour.



#### Portable Pumping Boosters

Heats bituminous material by direct firing in one operation, loading directly to distributor, relay truck or returning to tank car. Two sizes, truck mounting or 4-wheel trailer.



#### Portable Tank-Car Heaters

Available in 2 and 3 tank-car sizes. Oil-fired with exclusive four-pass flue travel; dry-coil steam condensate return under pressure—no water or heat loss. Provides a portable source of steam wherever needed.

# Cleaver-Brooks

Pioneers and Originators of ★ TANK CAR HEATERS ★ BITUMINOUS BOOSTERS ★ AUTOMATIC STEAM-PLANTS

REGISTRATIONS SHOW IT—OPERATORS KNOW IT!

# "FORD TRUCKS LAST LONGER!"

90 H.P.  
YOUR PICK OF POWER  
100 H.P.

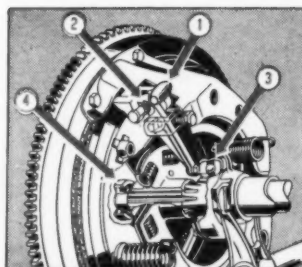
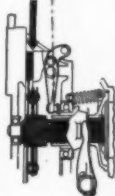
Wherever earth, building materials, coal or similar bulk loads have to be hauled, you'll find Ford Trucks paying off handsomely. This Heavy Duty Ford 2-ton unit has Hoist and Dump body by Marion Metal Products Co., Marion, Ohio.



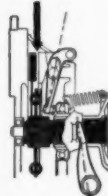
## **ONE big reason: FORD CLUTCHES STAND UP!**

Torque-transmitting capacity of Ford clutches increases with engine speed, because centrifugal force is harnessed to add *extra* pressure to that exerted by the clutch springs. Thus, slippage and wear are minimized. Three weighted, cam-action levers (1), due to centrifugal force, act upon the back of the clutch plate, forcing it ever more firmly into contact with the clutch disc. Needle roller bearings (2) on these pivoted levers, and pre-lubricated ball pilot and throwout bearings (3 and 4), reduce wear at these vital points and promote easy pedal action. No internal lubrication is required.

ENGAGED



DISENGAGED



Ford



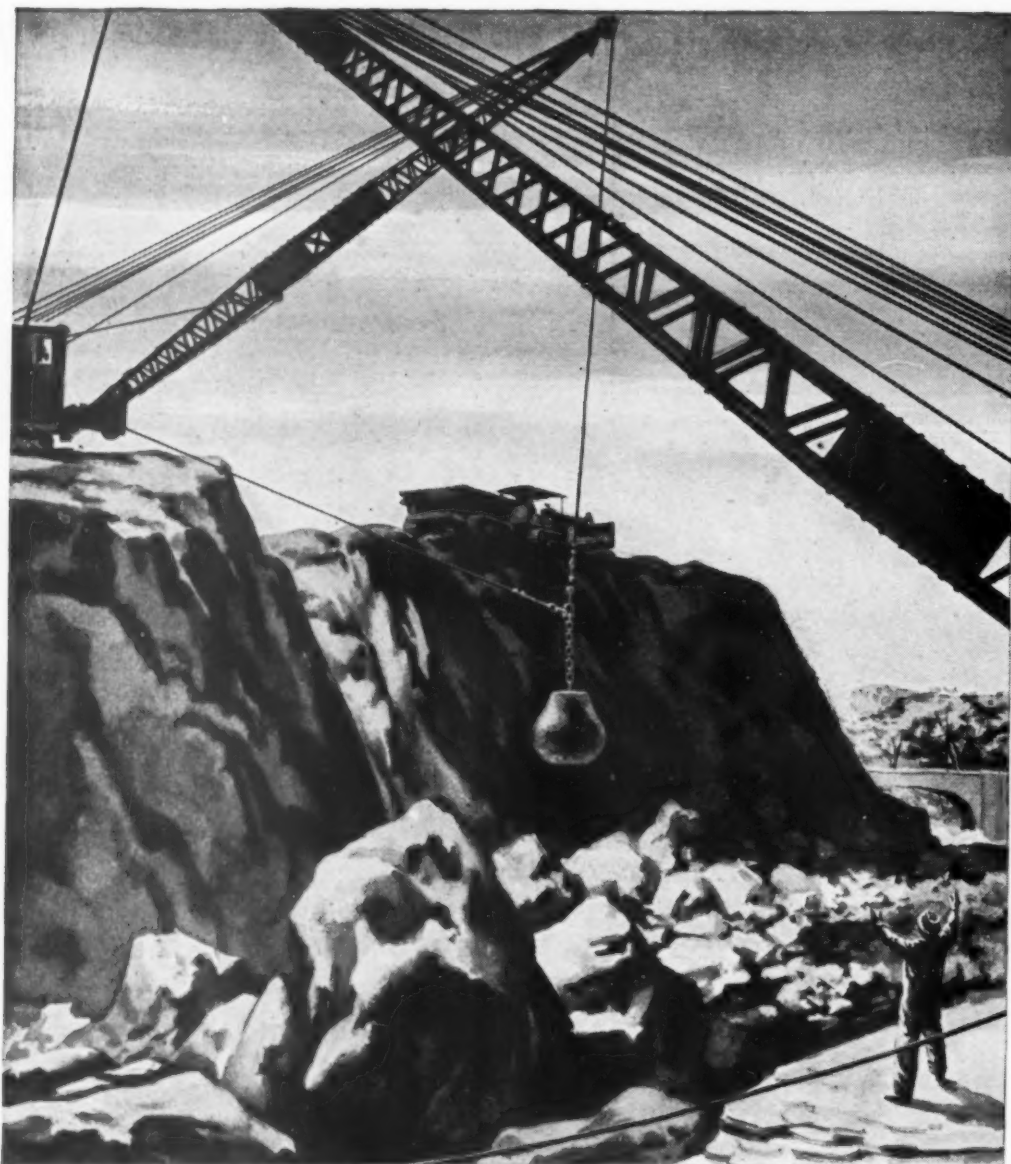
ONLY IN A FORD TRUCK do you get your choice of two great engines, the 100-H.P. V-8 or the 90-H.P. Six. ONLY FORD brings you all these long-life features: Easy-turning, rolling-contact steering gear, with triple roller bearings—weather-proofed Hi-Volt ignition—positive control of engine temperature for swift warm-up, protecting bearings, cylinders, pistons, rings and valve mechanism—rear axle design which takes all weight-load off the axle shafts ( $\frac{3}{4}$ -floating in half-ton units, full-floating in all others)—all told, *more than fifty* such endurance-assets!

Where can so few truck dollars get you so much *truck value*? Ford endurance-engineering explains why FORD TRUCKS LAST LONGER . . . why the average age of all Ford Trucks in use is nearly 9 years . . . why 7 out of 11 of all Ford Trucks built since 1928 are still in use! Only the costliest makes match this record. No wonder that demand for new Ford Trucks is forcing production schedules higher and higher. See your Ford Dealer now!

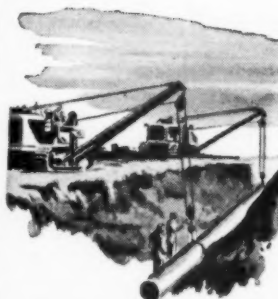
## **FORD TRUCKS**

MORE FORD TRUCKS IN USE TODAY THAN ANY OTHER MAKE

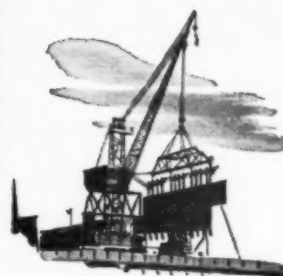
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You'll see more and more jobs like these as the nation's new highway and airport building program gets under way. Skull-crackers and drag-lines use a lot of Preformed wire rope to get the material out.



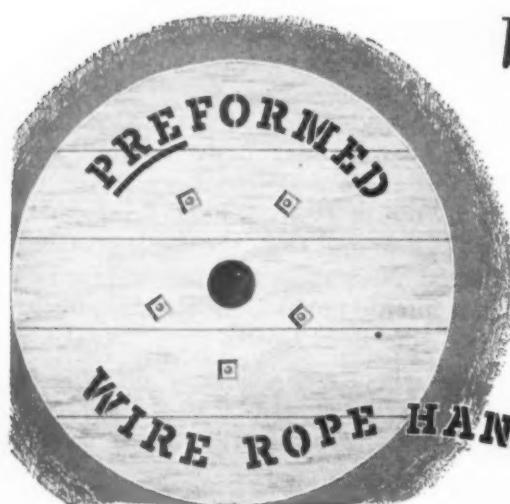
Laying pipe lines is a fast job today with machines and Preformed wire rope. Improved methods and improved wire rope make the work easier and faster.



Do you worry when you see great weights lifted by shipyard cranes? The operators don't, for they know the Preformed wire rope will hold.

## Here you see Post-War Progress in Action...

### *Wire Rope Makes it Possible*



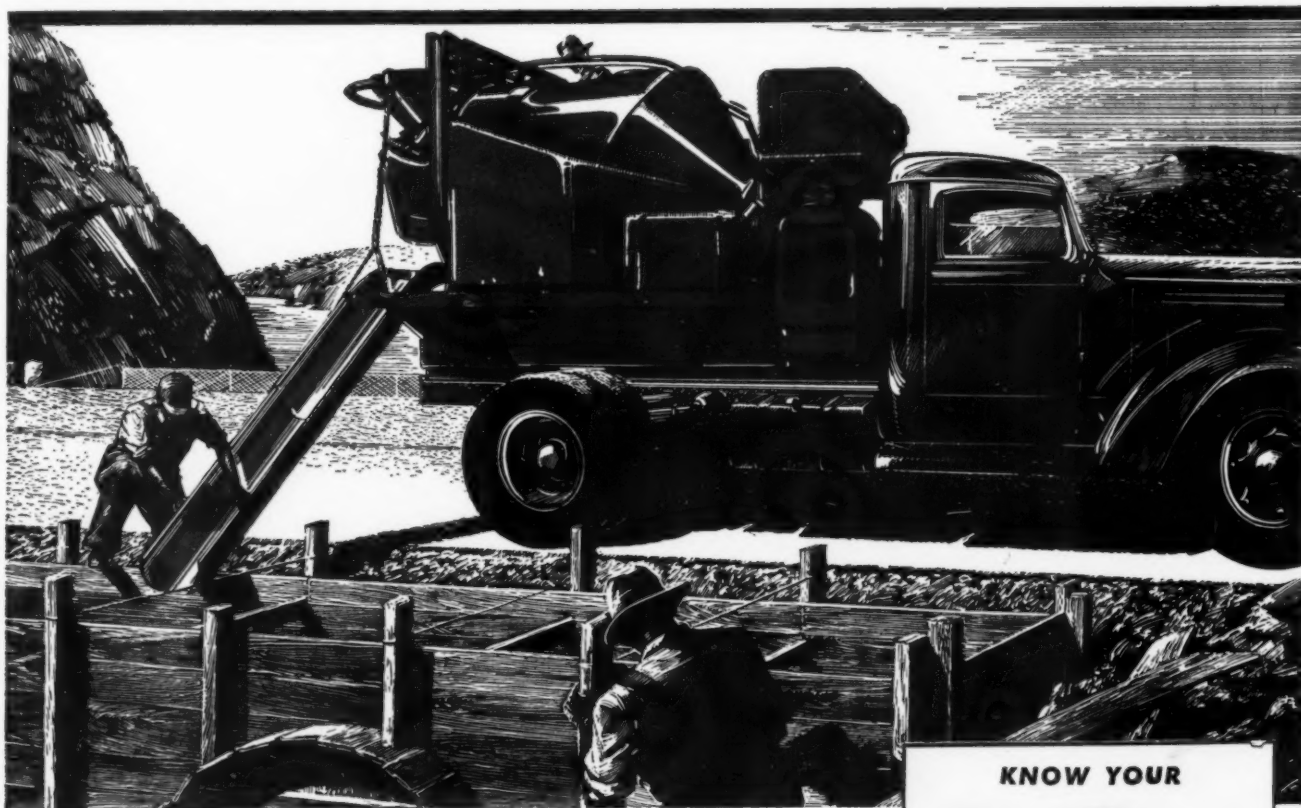
For the busy post-war days ahead, machines are rigged with Preformed wire rope. It lasts longer. It reduces time lost for replacement. It handles easier. It is safer. These operators and the front office agree Preformed is the rope for post-war progress.

ASK YOUR OWN WIRE ROPE MANUFACTURER OR DISTRIBUTOR

**WIRE ROPE HANDLES EASIER - LASTS LONGER**



# HI-UP... IN NAME, REPUTATION AND QUALITY



Flexibility, engineered into all Ransome Blue Brute Truck Mixers, reaches its peak in the new Hi-Up. This flexibility eliminates all strains resulting from misalignment while charging, discharging, or operating over uneven ground. The truck mixer is designed so that when discharging is completed, all moving parts return to their normal positions.

The transmission shows a marked advance over usual design. Enclosed water pump clutch requires no adjustment and at no time is there any need for manual lubrication. A separate engine clutch, two speeds forward and reverse, and multiple disc clutches assure easier starting, a wider performance range and smoother operation.

*Other new design details:* Unbreakable, anti-freeze gauge glasses, in full view of the operator . . . Quick-charging, unobstructed hopper, with improved sealing door, prevents jamming . . . Positively leak-proof poppet valves with renewable discs — found only in Ransome Truck Mixers . . . Exclusive mixing drum design, with new type spiral blades, for quick charging and fast, clean discharging.

These are but a few of the reasons why the Blue Brute Hi-Up is setting a new high in truck mixer performance — and offering time-saving, trouble-free production of better concrete at lower cost.

Get the whole story from your nearby Worthington-Ransome dealer, or write for Bulletin No. 221.

RS-7

## KNOW YOUR

## BLUE BRUTES

Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your planning on a profitable basis.

### RANSOME EQUIPMENT

Pavers, Portable and Stationary Mixers, Truck Mixers, Pneumatic Placing and Grouting Equipment and Accessories.

### WORTHINGTON EQUIPMENT

Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

## BUY BLUE BRUTES



Truck Mixers  
Capacities:  
2, 3, 4½ cu. yds.



Portable Mixers  
Capacities:  
3½, 6, 11, 16, 28 cu. ft.



Big Stationary Mixers  
Capacities:  
28, 56, 84, 126 cu. ft.



Pneumatic Placer  
Capacity:  
7, 14, 28 cu. ft.

## WORTHINGTON



Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.



# CONTRACTORS: save money with trucks that fit your job!

● In buying new equipment, it will pay you to consider *carefully* a truck that will *fit your job*.

With a "Job-Rated" truck—you get time-proven *economy* and dependable *performance*—day after day, year after year!

And naturally, "Job-Rated" trucks *last longer!*

Yes... when you buy a "Job-Rated" truck, you have the assurance that every unit—such as engine, clutch, transmission, and brakes—will be engineered and built for "top" performance and maximum economy—with *your* loads, over *your* roads!

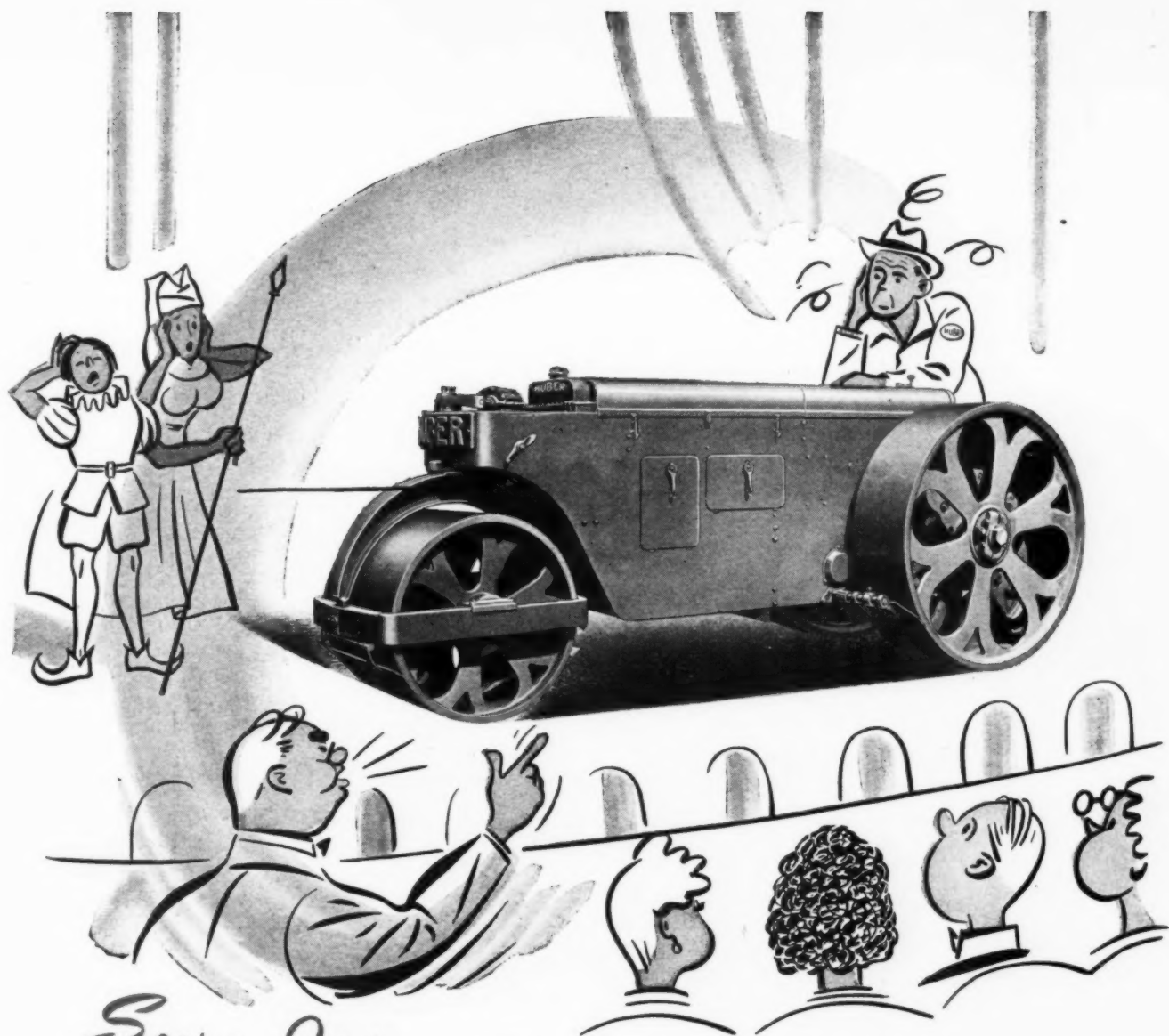
With its wide range of 175 "Job-Rated" chassis models—Dodge can best fit *your* job—save *you* money!

Ask any Dodge owner how well he's satisfied with the economy, performance and long life of *his* Dodge "Job-Rated" truck—and you'll need no further urging to see your Dodge dealer about a "Job-Rated" truck to fit *your* job!

**Only DODGE** builds  
*"Job-Rated"*  
trucks



**DODGE** *"Job-Rated"* **TRUCKS** **FIT THE JOB !  
LAST LONGER !**



*Sure It's a Star Performer...*

..... but a HUBER ROAD ROLLER is not a means of entertainment. It is an honest-to-goodness working tool that gets "top billing" in any contractor's language—and plenty of "curtain calls" for performance, economy, and service. This is your "cue" to check the many features of Huber Rollers that will make a "hit" with you.

THE **HUBER** MFG. COMPANY • MARION, OHIO, U. S. A.

**HUBER** *3 Wheel • Tandem*  
**ROAD ROLLERS**  
*and*  
**MAINTAINERS**

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# Gulf Quality Lubricants and Fuels

help contractors keep ahead of schedule  
on big track relocation project



The Hunkin-Conkey Construction Co., and Shofner, Gordon & Hinman combined equipment and personnel to handle the relocation of tracks on the Conemaugh Division of the Pennsylvania Railroad. The tracks must be moved to make way for a new flood control dam on the Conemaugh River near New Alexandria, Pa.

**T**HIS \$4,426,000.00 track relocation project is one of many important rush jobs where Gulf quality lubricants and fuels work as a team to help contractors make faster progress, higher profits!

Here's why so many leading contractors are partial to Gulf products: They have found that Gulf lubricants provide a higher degree of protection to equipment that's pushed to the limit—and that Gulf fuels are of a uniform high quality that insures maximum engine performance. Result: fewer delays, more efficient operation, lower maintenance costs, and jobs finished ahead of schedule.

Write, wire, or phone your nearest Gulf office today and arrange to use Gulf higher quality lubricants and fuels on your next job. They are quickly available to you through 1200 warehouses located in 30 states from Maine to New Mexico.

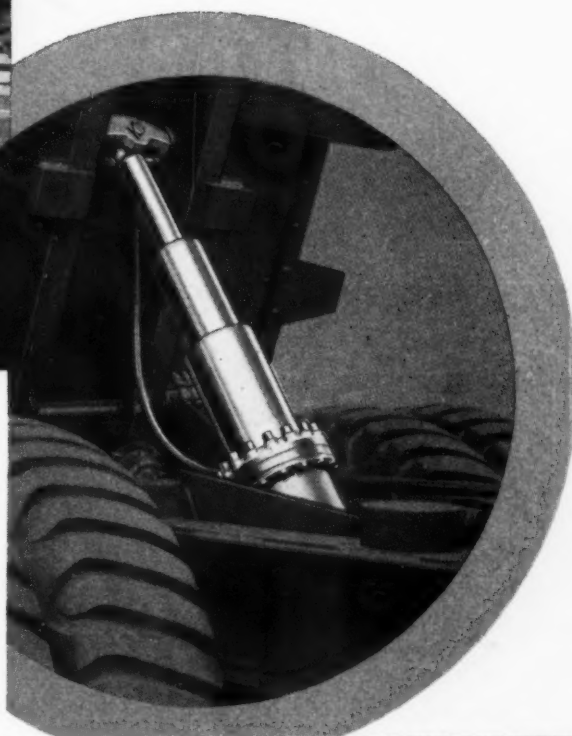


**Gulf Oil Corporation  
Gulf Refining Company**

*Division Sales Offices:*

Boston • New York • Philadelphia  
Pittsburgh • Atlanta • New Orleans  
Houston • Louisville • Toledo

# **EUCLID** *fast-acting* **HOIST** *Speeds Dumping*



**T**HE three-stage hydraulic hoist of Rear-Dump Euclids saves time and reduces hauling costs. Of Euclid design and manufacture, the powerful hoist and its hydraulic system provide fast, dependable operation and ample capacity for the rated payloads.

Here are some of the features that make the Euclid double-acting hoist unequalled for the heavy duty service of off-the-highway work on construction projects, in open pit mines and quarries, and on industrial operations:

*Raises Loaded Body Fast . . .* Engine speed controls dumping speed; ample hoist capacity for full payload.

*Dumps the Load Clean . . .* Hoist has 37" stroke which raises body to 70° from horizontal.

*Provides Complete Control of Body . . .* Conveniently located hoist valve has four positions: raise, lower, float, and hold. All or part of the load can be dumped according to job requirements.

*Lowers Body Quickly . . .* Hoist is double-acting in third stage . . . lowers the body under power to the point where it settles quickly by gravity.

Ask your Distributor or Representative to show you how all Euclid models, Rear-Dump and Bottom-Dump, are built throughout for efficient, long life in off-the-highway service.

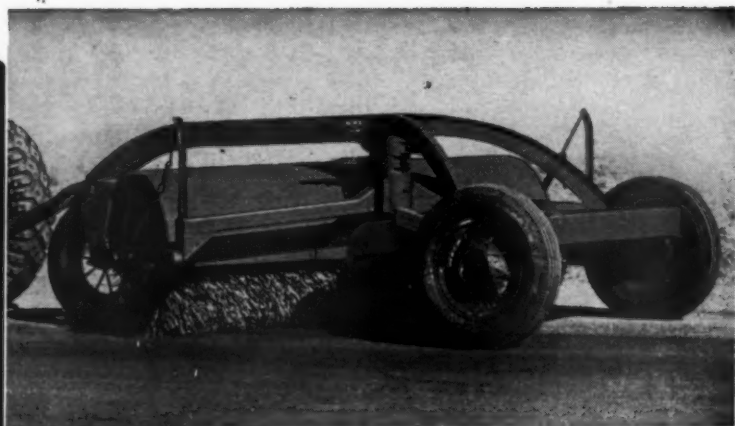
**The EUCLID ROAD MACHINERY Co.**  
CLEVELAND 17, OHIO



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*Grace*

**ENGINEERED  
EQUIPMENT**  
*that means*  
**ECONOMY,  
EFFICIENCY**



**GRACE SWEEPERS**

For the big jobs ahead this year, Grace has a Sweeper ready to go to work for you . . . doing the job economically, efficiently, built on engineering principles. With extra-long-life bristles . . . for cleaning road base prior to applying asphalt, sweeping streets, or for airfield work. Available in axle driven (above), motor driven, or for front end of tractor types.



**CIRCULATING TANK CAR HEATERS**

Grace Circulating Tank Car Heaters have proven to be the fastest way to heat the coldest car of asphalt. Flues are specially designed to heat and unload any type asphalt from tank cars. Pumps up to 250 GPM, reaching and maintaining temperatures up to 450° quickly and economically. Flue construction provides positive circulation and prevents burning or overheating.

**PNEUMATIC ROLLERS**

Grace Pneumatic Rollers are engineered to keep the load close to the ground, eliminating tipping. Made with 10 tires, oscillating axles, large body and plenty of ballast room.



**WRITE TODAY FOR DETAILS**

*Other Grace Equipment Built on Engineering Principles Include Sheepfoot Rollers, 600-Gal. Maintenance Kettle, Drag Brooms and Concrete Carts*

**W. E. GRACE MANUFACTURING COMPANY**

6005 S. LAMAR STREET

DALLAS, TEXAS



# Here's the plant...



**... that fits all aggregate production requirements —**  
**... any quantity ... any specification**

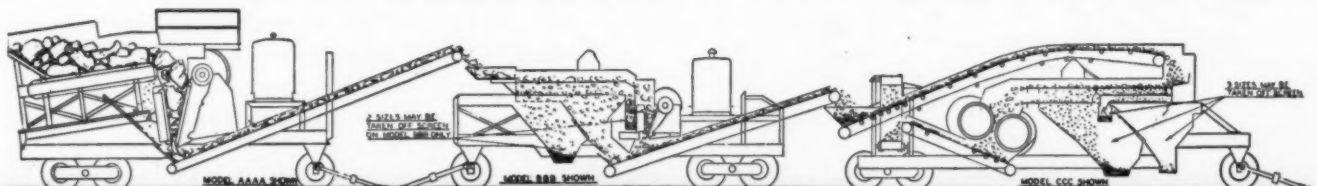
IT'S A Cedarapids Unitized Plant that will crush, size and wash rock or gravel to fit any specification from riprap stone to agstone. The complete set-up consists of a primary crusher unit, a secondary crusher unit, a roll crusher unit and a washing and sizing unit. Each unit is complete in itself and can be used alone or in any one of a dozen different combinations depending upon the pit or quarry and the finished product desired. A wide range of sizes of each unit makes it possible to have a plant

with almost any desired capacity. Choice of roll crusher, cone crusher, twin jaw crusher or hammermill provides still more flexibility.


You can start with the secondary jaw and roll units to produce crushed gravel and add the other units as your demands increase. Get the complete story from your nearest Cedarapids distributor and study the flow diagram below.

When buying a crushing plant — buy the best — buy Cedarapids.

**Iowa Manufacturing Company, Cedar Rapids, Iowa, U. S. A.**



**THE IOWA LINE of Material Handling Equipment Includes:**

ROCK AND GRAVEL CRUSHERS	STRAIGHT LINE ROCK AND GRAVEL PLANTS	TRAVELING (ROAD MIX) PLANTS	 <div style="border: 1px solid black; padding: 2px; display: inline-block;">Built by IOWA</div>
BELT CONVEYORS—STEEL BINS	FEEDERS—TRAPS	DRAG SCRAPER TANKS	
BUCKET ELEVATORS	PORTABLE POWER CONVEYORS	WASHING PLANTS	
VIBRATOR AND REVOLVING SCREENS	KUBIT IMPACT BREAKERS	TRACTOR-CRUSHER PLANTS	
		STEEL TRUCKS AND TRAILERS	

PORTABLE STONE PLANTS  
 PORTABLE GRAVEL PLANTS  
 REDUCTION CRUSHERS  
 BATCH TYPE ASPHALT PLANTS

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# Why must secondary roads be "Stepchildren"?



Get to them sooner—open them faster  
with  
**WALTER SNOW FIGHTERS**

**S**ECONDARY ROADS are often neglected because main highways tie up equipment too long. The delay makes snow conditions worse and imposes serious hardships on rural dwellers.

Here, again, highway departments equipped with Walter Snow Fighters enjoy a big advantage. Because these fast, powerful Walter units clear main highways much quicker (20-30 m.p.h.)—you get to secondary roads much sooner. be-

fore drifting, packing and freezing can complicate the job. No matter what conditions you find, Walter Snow Fighters will blast through in record time.

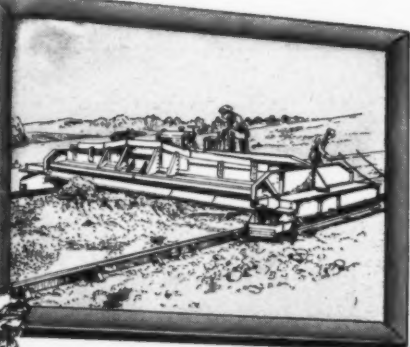
This faster clearing of Walter Snow Fighters comes from the great power and 100% traction supplied by the exclusive Four-Point Positive Drive. This provides maximum plowing speeds in pouring snow, opening drifts or travelling icy surfaces. There is no side-slipping, no stalling; no wheel spinning. Available in models from 125 hp. to 350 hp., with every type of equipment, to bring any snow conditions speedily under control. See your Walter distributor or write us for detailed literature.



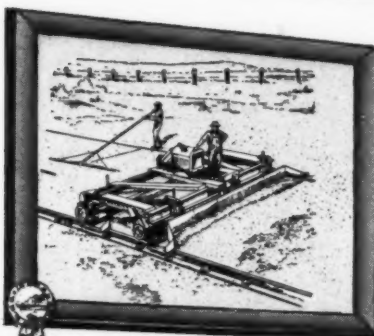
**WALTER MOTOR TRUCK CO.** 1001-19 Irving Ave.  
Ridgewood 27, Queens, L. I., N. Y.

**WALTER**  
**SNOW FIGHTERS**

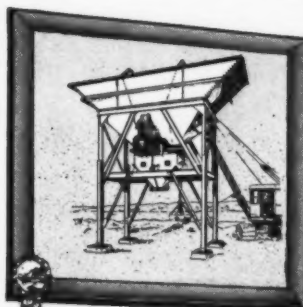




PAVING SPREADERS FOR ROADS & AIRPORTS



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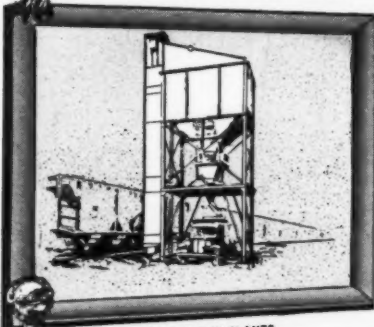
AGGREGATE BATCHING PLANTS



TRUCK MIXERS



CLAMSHELL BUCKETS



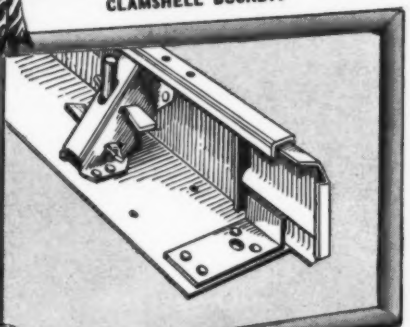
BULK CEMENT PLANTS



CONCRETE BUCKETS



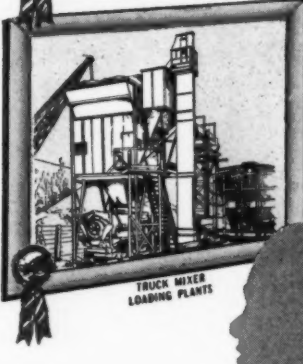
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When the requirement is *speed* — a top-quality paving job in the shortest time with minimum crews — Blaw-Knox can equip the contractor to lay more paving per day at less cost per yard.

If you are interested in that kind of performance, write today for a copy of Bulletin No. 2036 — or consult your nearest Blaw-Knox distributor.

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# PUMPING OVER 1,500,000 GALLONS OF WATER DAILY!



This Chrysler Industrial 7 engine pumps over 1,500,000 gallons of water daily for a large Texas farm.

**D**ESIGNED and built for rugged day-in, day-out operation, Chrysler Industrial Engines are pumping millions of gallons of water daily to irrigate many of America's large farms.

With their high compression, flexible horsepower characteristics, these engines are compact and portable because of low weight per horsepower. Simplicity of design makes them readily accessible.

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Send coupon for the Industrial Engine catalog giving complete information on engines and power units.

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# YOU CAN BUILD THESE FROM 6 INCH SNOWS



Figure the depth  
of this, pushed up  
in banks

Start piling it up—a six inch snow today, three inches the day after, another six inches and so on. Then maybe you get a whopper and you've got banks you can't get rid of.

Handle the light snows with Snogo too. Either windrow it with blades and throw it into the fields or throw it directly from the road into the fields.

Snogo builds no banks into ever deepening narrow lanes that blow back on to the road surface and call for costly rehandling. Snogo throws the snow from 100 to 200 yards into the fields where it can do no harm. It *can't* build up drifts. Snogo cleared roads stay cleared until the next snowfall.

Snogo means open winter roads, safer winter roads. The kids get to school *and back*. Winter business holds up. The loss in perishables is cut and winter road damage is reduced. Handle *all* your snow with Snogo.

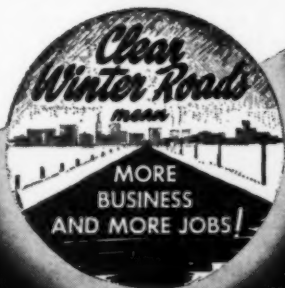
Remove it—don't just move it.



Throw it away  
and it can't  
build up

## SNOGO

A SNOGO For  
EVERY BUDGET



**KLAUER MANUFACTURING CO.**  
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WIRE ROPE



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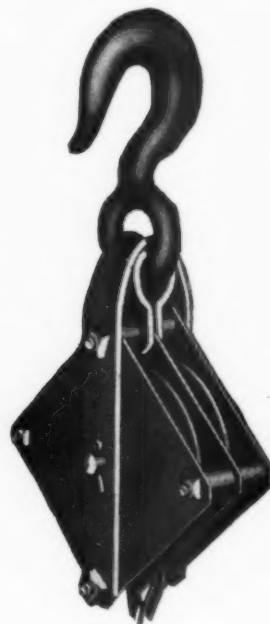
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WIRE ROPE SNATCH BLOCKS

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DIAMOND FRAME  
WIRE ROPE BLOCKS



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NOTE: As we go to press, deliveries on turn-buckles and shackles are also good.

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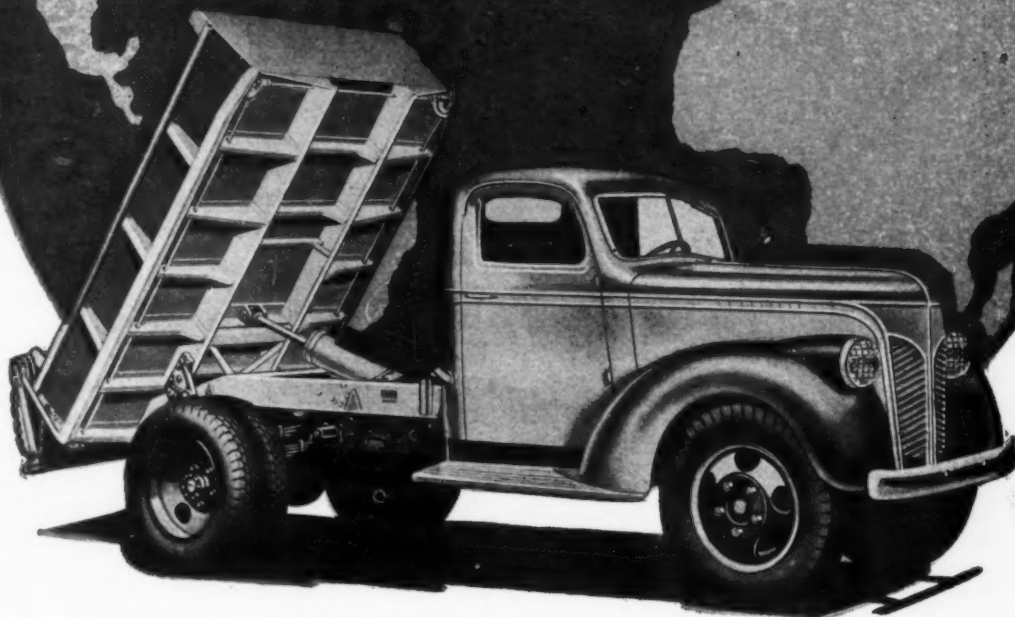
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**IN USE EVERYWHERE...**

*They've got to be good!*



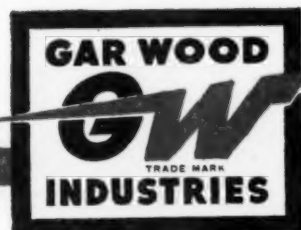
From one end of the world to the other, you'll find Gar Wood Hoists and Dump Bodies in action. The reason? They're designed, engineered, and built to do specific jobs, no matter how tough. Hydraulically operated, with simple controls...they dump cleanly, quickly, and easily...make it possible to get to the next job faster.

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Gar Wood Hoists and Dump Bodies have been, and are constantly being proven all over the world on the toughest jobs. For your next job, specify Gar Wood.

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### *The "Miracle Rod"*

For manganese or carbon steel parts such as dipper teeth, bucket lips, dragline buckets, bulldozer blades, sprockets and others that have to take a lot of punishment, Colmonoy No. 1 is your best bet. It is ideal for hard-facing many steel parts.

Colmonoy No. 1 is the "Miracle Rod" in the low-priced hard-facing field. It's hard!—from 62 to 64 Rockwell C. It outwears other rods in the same price class from 2 to 4 times. It's tough!—withstanding any impact. It's weldability is tops!

Although low in price Colmonoy No. 1 is a high quality product. In the flux coating are the diamond-hard Colmonoy crystals which alloy with the special steel core during the application.

***Order a box today and try it on your next job!***

**WALL COLMONOY CORPORATION**

**7TH FLOOR FISHER BLDG., DETROIT 2, MICH.**

# There's a Standard Blackhawk Ram for Every Road Job



**Power-Driven P-104**

Power-Packer Pump—belt or gear driven—control valve is operated from cab. Compact, easily installed.

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Power-Packer Pump—mounts in cab. Blackhawk is also the source for RAMS and VALVES used with these pumps.



## For Faster, Safer, More Dependable Performance . . . Demand **BLACKHAWK HYDRAULIC CONTROLS** on ALL Your Road Equipment

**Y**OU'RE turning the "muscle-work" over to a real toughy when you depend on Blackhawk Hydraulic Controls to actuate moving parts on your road equipment. A fingertip touch on a conveniently located lever puts these fast-acting, dependable rams to work lifting and lowering — safely and accurately. Blackhawk rams are compact and powerful — easily adapted to all road equipment. For "easy going"

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### TO EQUIPMENT MANUFACTURERS

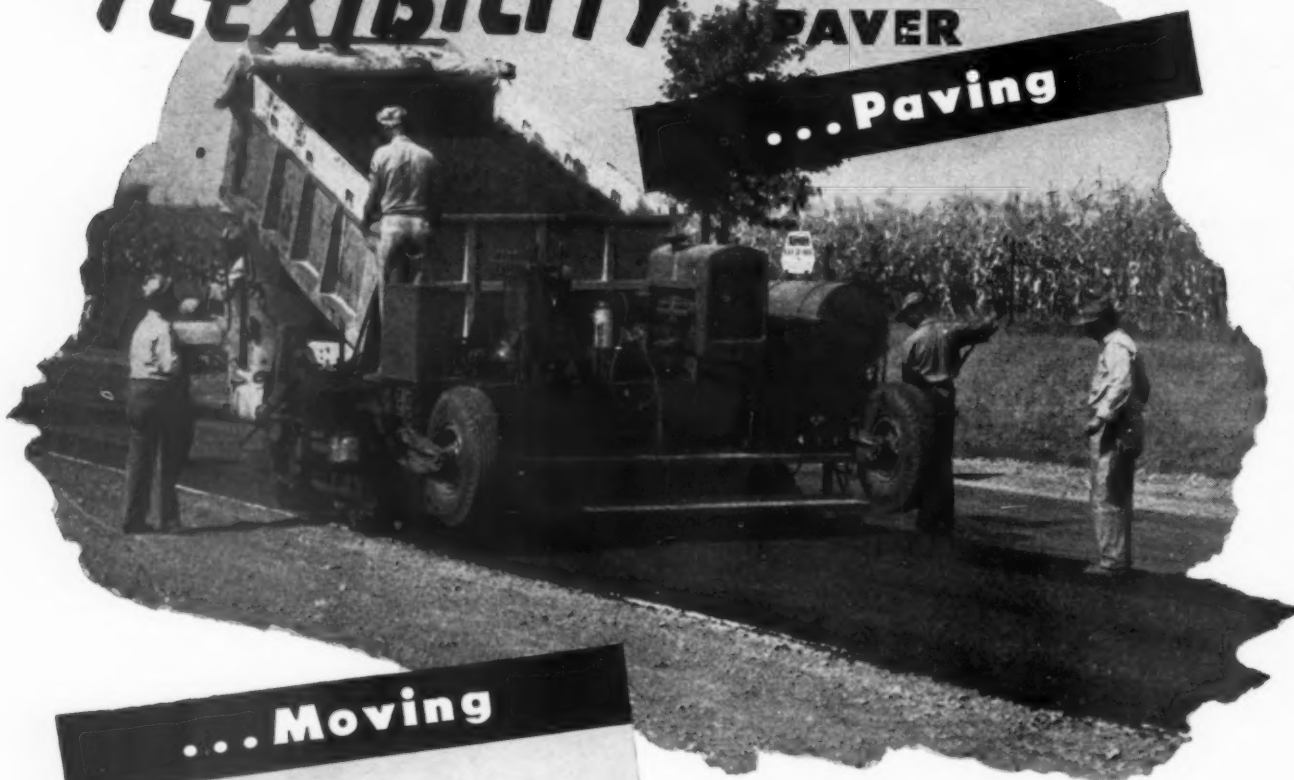
*Blackhawk Hydraulic Controls are engineered and priced for quantity purchases and practical installation on the products of other manufacturers. Submit your hydraulic problems to us. We will work with you in confidence.*

A Product of **BLACKHAWK MFG. CO.**, Dept. RS, Milwaukee 1, Wisconsin

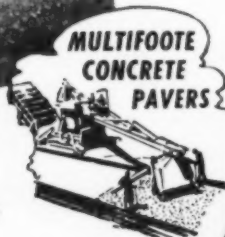
# BLACKHAWK



# Only **ADNUN** gives you this **FLEXIBILITY** in a **BLACK TOP** **PAVER**



Retractable wheels can be attached to Adnun Pavers already on the job, as well as to new machines. When ordering, please be sure to give serial number of your Adnun.



**MULTIFOOTE  
CONCRETE  
PAVERS**

**PAVING . . .** Adnun Black Top Pavers continue to make records for fast, low-cost paving on a wide range of jobs. You can lay all of these materials with an Adnun: any type of bituminous paving, hot or cold, stone, slag, sand, gravel or soil cement. And Adnun Continuous Course Correction, hydraulic controls, power-cutoff, and many other exclusive advantages add up to real flexibility that means precision paving on more jobs for more profit.

**MOVING . . .** Between jobs, and returning the paver to begin a new strip, Adnun retractable wheels save you valuable time and labor . . . Just drop the wheels and roll smoothly over newly-laid pavement—or cobblestones—without damage to machine or road surface. Adnun can be easily towed, or operated under its own power when retractable wheels are down.

**MANEUVERING . . .** Turning around, or getting into position to begin paving, an Adnun simplifies the operator's job and permits more time on work that makes the profit: actual paving operation.

Your Adnun Distributor has the whole story on Adnuns . . . Ask him for details, or write us direct.

**THE FOOTE CO., INC.**

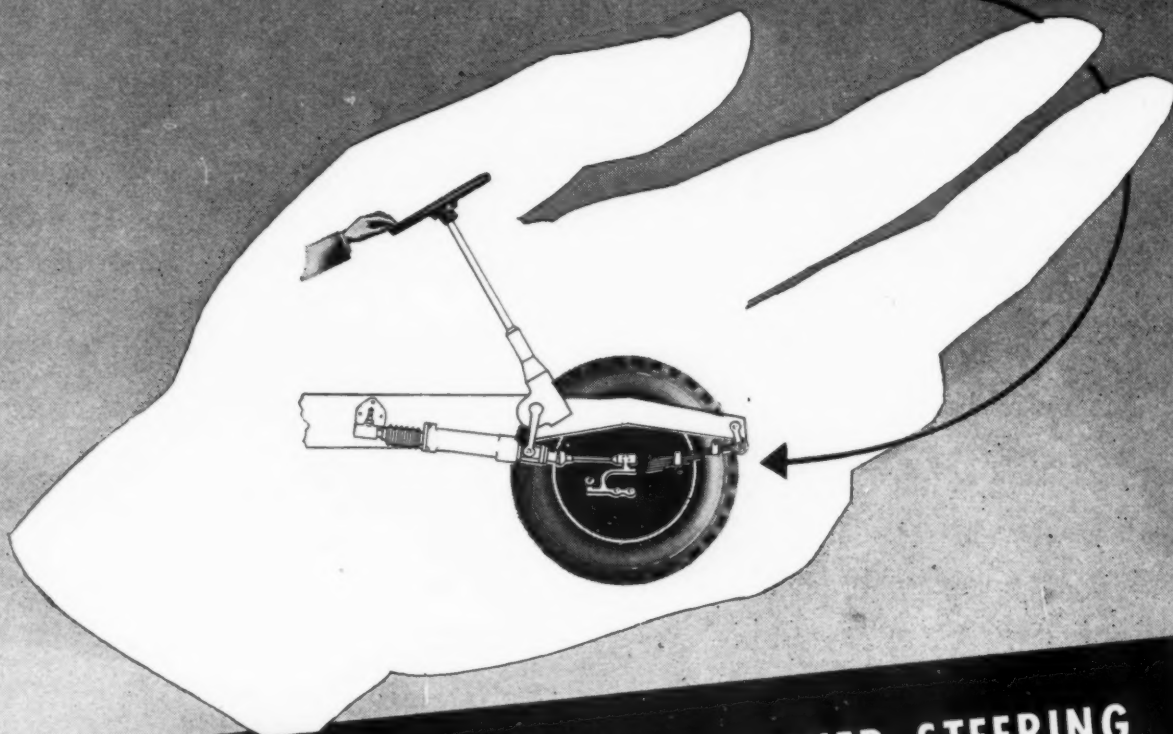
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# ADNUN

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## BLACK TOP PAVER

# INSTANTANEOUS FINGER-TIP RESPONSE



## with **VICKERS** HYDRAULIC POWER STEERING

Two fingers on the steering wheel—it turns easily, and the front wheels of the heaviest truck or bus follow exactly. Vickers Hydraulic Power Steering does the work. And steering is just as easy over the roughest ground off the road as it is on smooth concrete. Road shock *cannot* be transmitted from the front wheels to the steering wheel or driver.

Steering is instantly responsive and firm—no rubbery feeling or wander. The driver is relieved of the

most exhausting part of his job, enabling him to get more done with less fatigue.

Vickers Hydraulic Power Steering has many other advantages: (1) requires minimum space and is applied to most existing hand steering mechanisms with a few simple alterations; (2) automatic protection against abuse and excessive steering reaction forces; (3) automatic lubrication; (4) 15 years of successful operating experience. Ask for Bulletin 44-30.

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# ADAPTABILITY TO CONCRETE CONSTRUCTION



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**SLIP-FORM**

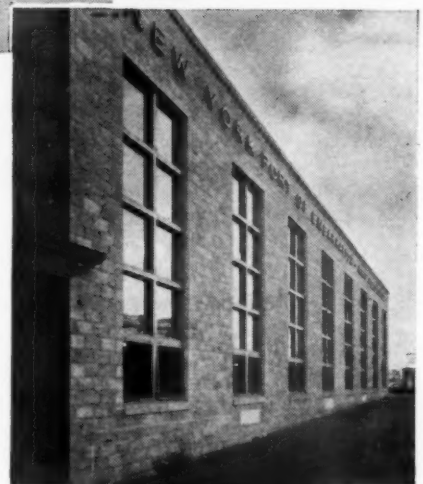
Since its introduction eight years ago, Atlas Duraplastic air-entraining portland cement has proved its versatility—its adaptability to almost every type of concrete work. The pictures show a few of its varied uses.

Duraplastic cement makes the concrete more plastic, more uniform and more durable. Its use requires no unusual changes in

methods—just the same good workmanship and careful supervision regularly employed. It complies with ASTM and Federal specifications and sells at the same price as regular cement.

**Send for further information.** Write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.

**OFFICES:** Albany, Birmingham, Boston, Chicago, Cleveland, Dayton, Des Moines, Duluth, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco.



**BLOCK**

RS-D-46

## ATLAS DURAPLASTIC

AIR-ENTRAINING PORTLAND CEMENT

**MAKES BETTER CONCRETE AT NO EXTRA COST**

TRADE MARK REG.  
U. A. C. CO.



"THE THEATRE GUILD ON THE AIR"—Sponsored by U. S. Steel—Sunday Evenings—ABC Network





*There's the*  
**RUB!**

*...and wherever wire rope works over sheaves—and on drums—there are also bending stresses. Heavy loads, too, add their burden.*

You can depend on "Hercules" (Red-Strand) Wire Rope to meet all conditions, because it is the right combination and balance of strength, toughness and durability. As it is made in Round Strand and Flattened Strand constructions—both Preformed and Non-Preformed—there is a correct type for every heavy duty purpose.

Let the Red-Strand be your wire rope guide to faster and more economical production. We invite your inquiries.

# "HERCULES"

REG. U.S. PAT. OFF.

**RED-STRAND**

**WIRE ROPE**



MADE ONLY BY

**A. LESCHEN & SONS ROPE CO.**

ESTABLISHED 1857

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# How

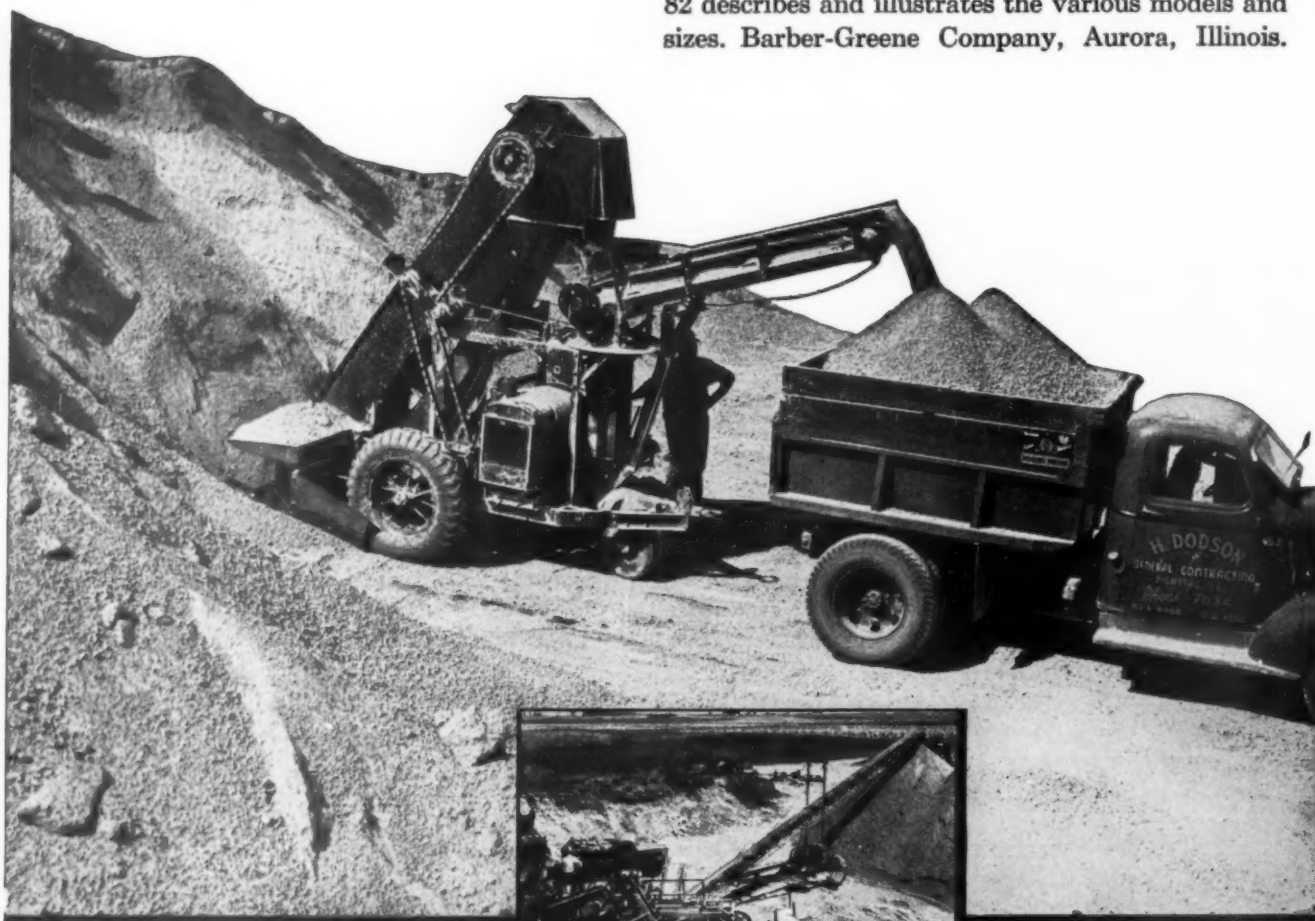
## **B-G** *Bucket Loaders*

### Save Truck Time

• Saving truck loading time is the equivalent of adding trucks to your fleet. And, Barber-Greene Bucket Loaders *are* saving truck time every day through their high capacity and efficiency in loading from stock piles. They're specially designed for this job—a job no other method approaches from the standpoint of saving time.

In addition, Barber-Greene Bucket Loaders are easily maneuvered around the yard or pit, and, where conditions warrant, can be equipped with a special high travel speed for moving from stock pile to stock pile.

The Barber-Greene Bucket Loader Catalog No. 82 describes and illustrates the various models and sizes. Barber-Greene Company, Aurora, Illinois.



*This B-G Portable Belt Conveyor provides a flexible storage system for bulk materials ... builds long parallel piles or large radial stock piles.*



**CONSTANT FLOW EQUIPMENT**



# When You're Traxcavating, You're PROFIT-MAKING!

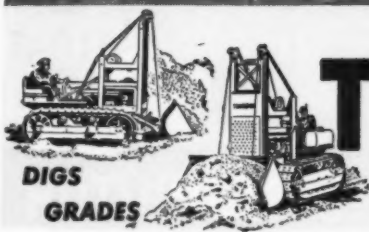
TRAXCAVATORS get things done! Put them to work digging, loading, carrying, grading and watch your hourly production climb — your operating costs fall. TRAXCAVATORS are seldom idle because these versatile, multi-purpose machines combine the usefulness of a shovel, loader, scraper, bulldozer — and with the available interchangeable attachments, they are the "workingest" machines you ever saw. More work, on more jobs, more days in the year mean low-cost, top notch performance and greater profit.

TRAXCAVATORS are built in four sizes — for every job and purpose — with bucket capacities from 1/2 to 4 cubic yards. Each is a balanced unit with the rugged "Caterpillar" track-type tractor by which it is powered. Learn now why it pays you to traxcavate—get the facts from your TRACKSON-"Caterpillar" dealer or write direct to TRACKSON COMPANY, Dept. RS-17, Milwaukee 1, Wisconsin.

At Left: TRAXCAVATOR removing a tree for street widening

Upper Right: The same machine handles the grading for street widening

Lower Right: TRAXCAVATOR handling pipe on sewer construction, also cleared and graded the right of way



## TRAXCAVATOR

REG. U. S. PAT. OFF.

THE ORIGINAL TRACTOR EXCAVATOR



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# IT'S EASY TO OPERATE A

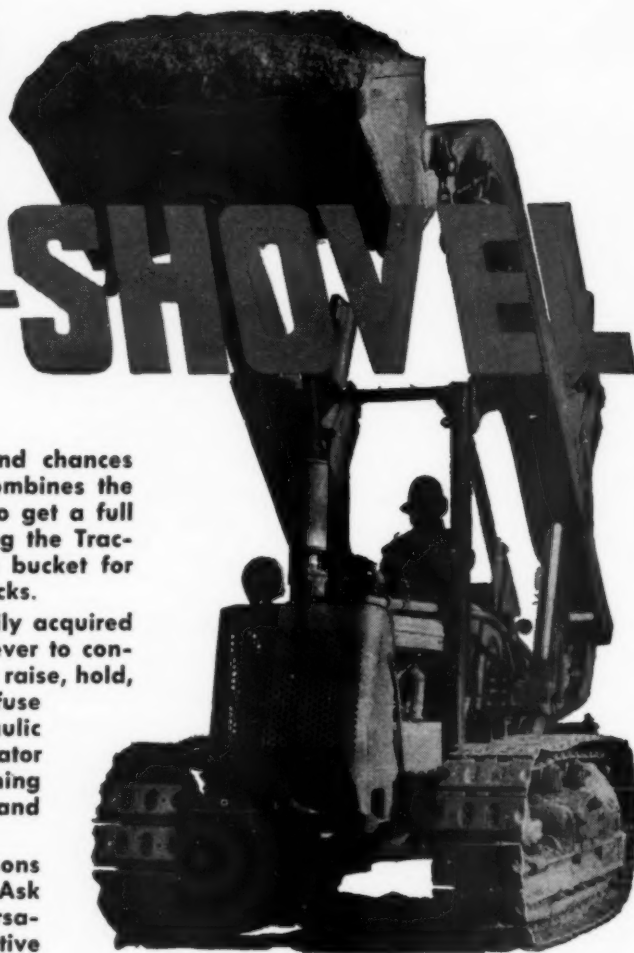
# DOZER-SHOVEL

**W**ATCH any Bucyrus-Erie DOZER-SHOVEL operator and chances are you'll be amazed at the ease with which he combines the action of the bucket and the travel of the TracTracTor to get a full load . . . to lift the bucket out of the ground and swing the TracTracTor at the same time . . . to dump and lower the bucket for latching while the TracTracTor backs away from the trucks.

Skill? Certainly — but a skill that's much more easily acquired than you might suppose. The operator uses only one lever to control all of the functions of the DOZER-SHOVEL attachment: raise, hold, lower, float. There is no fighting of many levers to confuse him and slow production. The single four-position hydraulic control, easy to reach and easy to shift, lets the operator keep his eye on the bucket — quickly permits establishing the eye-hand coordination that means operating skill and high production.

Besides easy operation, there are plenty of other reasons why DOZER-SHOVELS can give you outstanding service. Ask your International TracTracTor Distributor about their versatility, full front visibility, low overhead clearance, positive down pressure, strong simple design, easy interchangeability.

39748



**BUCYRUS  
ERIE**

South Milwaukee, Wisconsin

## ONE LEVER 4 POSITIONS

Pull the control lever all the way back to the rear of the quadrant. You can raise a full bucket load simultaneously while moving the TracTracTor forward or backward or swinging it around.



The position for digging. In this "notch" you add downward thrust to the blade of the bucket or bulldozer for hard digging.



The second notch forward holds the bucket at any height. Use this position for digging into high banks and for maintaining accurate dumping heights when loading trucks or hoppers.



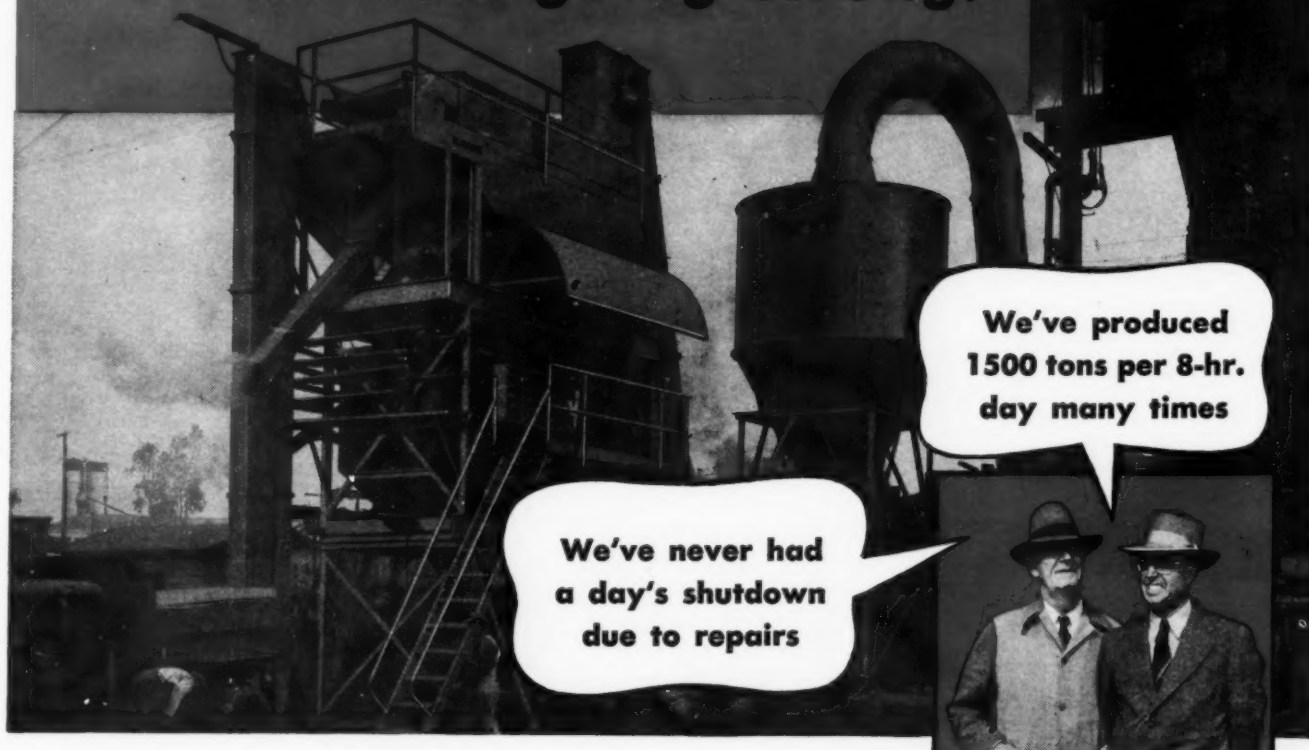
Commonly used to drop the bucket fast after discharging a load. Also ideal for finishing, dragging, leveling, etc., by backing the TracTracTor over the area being graded; the bucket edge is free to follow the surface, to move up or down by its own weight, similar to a cable operated machine.



**INTERNATIONAL TRACTRACTOR DISTRIBUTOR**

# 700,000 TONS

...and still going strong!



We've produced  
1500 tons per 8-hr.  
day many times

We've never had  
a day's shutdown  
due to repairs

## MADSEN ASPHALT PLANTS

**OPERATING 12 MONTHS** out of the year this Madsen Plant, owned and operated by Sparks & Mundo Eng. Co., has turned out 700,000 tons of asphalt-bound material without one day's shutdown due to repairs.

Mr. C. O. Sparks says, "We've produced 1500 tons per day many times during the continuous operation of our Madsen Plant."

The real test of an asphalt plant is continuous operation at high

production speeds... and Madsen Plants have the speed, the stability and design to consistently perform at high speed—it has been proved. Learn about all the Madsen-exclusive features which assure faster mixing, sustained production and long life. See for yourself the advantages of the Madsen Asphalt Injection System, High-Speed Sectional Pug Mill, Unit-Power Transmission and many others; write for illustrated catalog.

### MADSEN IRON WORKS

5631 Bickett St. • Huntington Park, Calif.

★ **C. O. SPARKS** of Sparks & Mundo Eng. Co., is a pioneer in the construction industry in California. His keen insight in asphalt plant operation and his 42 years of experience makes his active participation extremely important in the management of one of the largest businesses of its kind in Los Angeles. Mr. Sparks says, "We've ordered another 4,000-lb. Madsen Asphalt Plant just like the one we are now operating."

★ **35 YEARS** as a contractor, affiliated with the California construction industry since 1911, Mr. W. T. (Bill) Ellington is well known in the West. Bill's practical application of engineering to his company's operation has contributed greatly to the success of Sparks & Mundo Engineering Co. Mr. Ellington says, "We know from experience Madsen Plants will turn out as much as 30,000 tons per month without a single shutdown due to repairs."

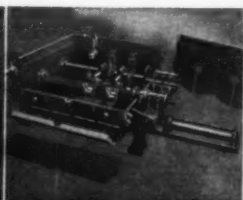


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## MADSEN



Asphalt Pressure  
Mixing Drum



Sectional twin-shaft  
Pug Mill



Asphalt Injection System  
& Pug Mill



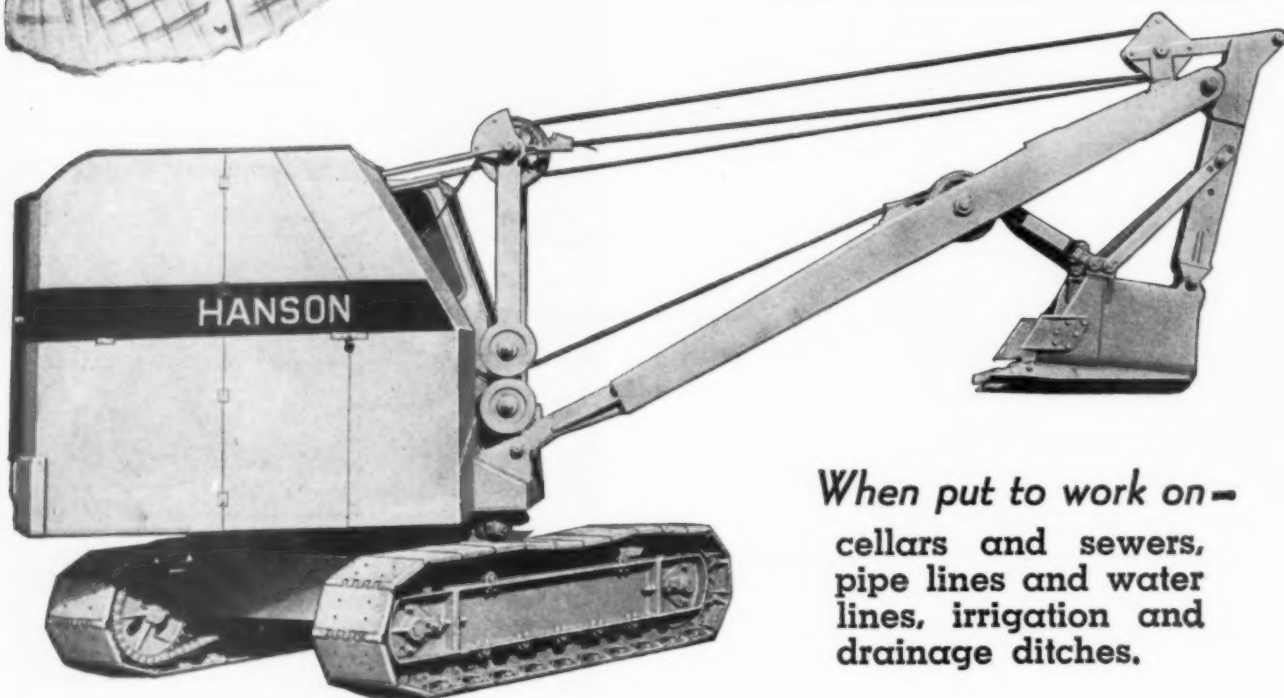
Overflow Bin for  
Hot Mix

**DISTRIBUTORS:** Birmingham, Ala., Armstrong Eq. Co.; Des Moines, Iowa, Herman M. Brown Co.; Seattle, Wash., A. H. Cox & Co.; Portland, Ore., Cramer Machy. Co.; Albuquerque, N. M., Harry Cornelius Co.; Houston, Tex., R. B. Everett & Co.; Denver, Colo., Elton T. Fair Co.; Omaha, Neb., Fuchs-Clayton Machy. Co.; San Francisco, Cal., C. H. Grant Co.; Atlanta, Ga., J. W. Grass Eq. Co.; Chicago, Ill., Hillsman Eq. Co.; Salt Lake City, Utah, Landes Machy. Co.; Seattle, Wash., Lomen Eq. Inc.; Dallas, Tex., Martin Machy. Co.; Spruce Pine, N. C., Mitchell Dist. Co.; Phoenix, Ariz., Smith-Booth Usher Co.; Lansing, Mich., Telford Eq. Co.; Charleston, W. Va., W. Va. Tractor & Eq. Co.; Minneapolis, Minn., Wm. H. Ziegler Co., Inc.

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# "It's a **REAL** **MONEYMAKER**"



*When put to work on—  
cellars and sewers,  
pipe lines and water  
lines, irrigation and  
drainage ditches.*

Where the going is tough and the time is short — where you can't afford to tie up equipment and man-power in "down-time", the stamina, speed and versatility of this Hanson will appeal to you.

Made in two sizes,  $\frac{3}{8}$  yd. and  $\frac{1}{2}$  yd. Easily convertible to crane, ( $4\frac{1}{2}$  and  $6\frac{1}{2}$  ton), shovel, clamshell or drag-line.

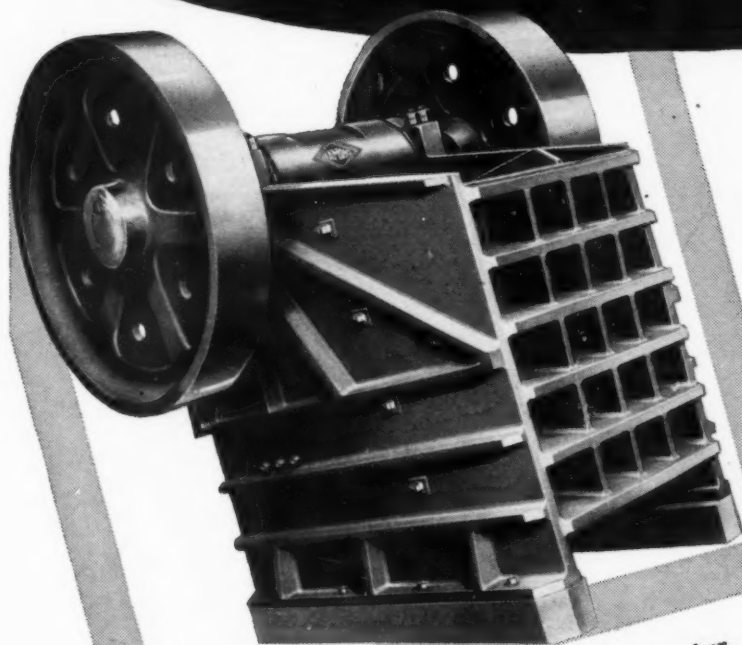
Some of the features which make this HANSON a money-maker: Full revolving . . chain crowd . . fully enclosed steel cab . . air-controlled steering . . all-welded, steel construction . . disc type clutches on swing . . internal expansion, booster-type clutches on hoist and crowd . . all clutches easily adjusted or relined without removing shaft assemblies . . extra long crawlers and low center of gravity . . speedy—versatile—rugged!

# HANSON

**CLUTCH AND MACHINERY CO. - TIFFIN, O.**

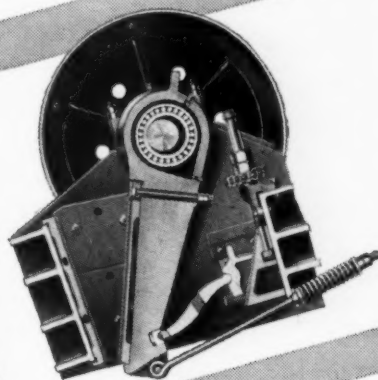


# Maximum PRIMARY OUTPUT



## WITH THE DIAMOND "LONG JAW" CRUSHER

Developed and improved thru years of use and constant observation of the needs of operation throughout the world, Diamond jaw crushers today embody the ultimate in economy of power, volume and uniformity of product with minimum of maintenance.



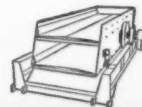
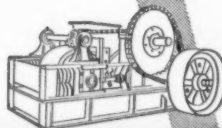
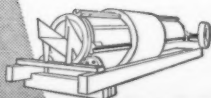
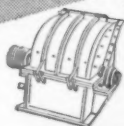
The triple action of the Diamond jaw crusher, combining a direct dynamic crunch with a relentless downward force feed action, operates from top to bottom of its long jaws. Its heavy overhead eccentric, while closing the jaws for the initial kill, supplies the downward action during the first half-cycle, and, at the up-turn, the secondary low-end crush is delivered by the rising toggle at the bottom of the jaws.

A POSITIVE AND UNIFORM CRUSHING CYCLE

MADE IN TEN SIZES

ASK FOR BULLETIN D45

• THERE'S NOTHING TOUGHER THAN A DIAMOND!



**DIAMOND IRON WORKS, INC.**  
AND THE MAHR MANUFACTURING COMPANY DIVISION

MINNEAPOLIS 11, MINNESOTA

The DIAMOND line of Rock and Gravel Crushing and Handling Equipment:

Portable Crushing and Screening Plants  
Portable Primary Crushing Plants  
Grizzlies  
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Jaw and Roll Crushers  
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By **W. W. Crosby**  
*M. Am. Soc. C. E. and*

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Between the covers of this book is a discussion on highway location, for the average highway, by two men who have had many years' experience in the work. Mountain highway location requires different technique than that employed in locating a highway in flat or rolling topography. Goodwin covered this subject for Col. Crosby. Speed is a factor entering into modern highway location to a great degree. This book discusses the many phases of this important part of highway engineering.

### CONTENTS

Book I.—Definitions; Historical; Present Situation; Traffic Actualities and Possibilities; Speeds and Safety; Signs; Alignment; Grades; Widths; Recreational Use of Highways Affecting Their Location; By-Passes; Routing; Economics and Formulae; Location Procedure; Afterword. Book II—General Instructions to Engineering Assistants Regarding Mountain Highway Location Surveys; Conclusion. Book III.—Notes on Highway Surveying; Bibliography.

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By **Delmar G. Runner**

*Assistant Materials Engineer, U. S. Public Roads Administration*

Rock and soils, and their characteristics, both physical and chemical, as well as their classifications and geographical distributions are discussed in such a way as to make this book particularly valuable for civil engineers and for engineering colleges. The chapters on material surveys, together with those on the petrographic microscope and its use constitute a real contribution to the fund of knowledge on engineering geology. This is the first time that the theories of general geology have been correlated by a competent engineer and geologist with the requirements of highway engineering. The book is written from the engineer's viewpoint for engineers. It puts into usable, understandable language the facts concerning rock formations and gravel deposits hardness or toughness values, how to recognize suitable or undesirable materials, and the source or origin of rock types. It is particularly useful to those engineers charged with the responsibility of materials selection for construction or maintenance work.

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Introduction; Value of Engineering Geology; Road Material Survey Methods; Relation of Geological Formations to Material Surveys; The Common Rock Making Minerals; Igneous Rocks; Metamorphic Rocks; Sedimentary Rocks; Origin and Roadbuilding Properties of Shale; Origin and Roadbuilding Properties of Caliche; Origin and Roadbuilding Properties of Limerock; Origin and Composition of Clays; Preparation and Properties of Blast Furnace Slag;

Low Cost Road Surfaces; Petrography and Quality of Rock; Sand and Gravel Deposits; Soils and Soil Tests; Glossary of Geological Terms; Glossary of Highway Terms; Names and Addresses of Highway Departments; States With Geological Commissions; Testing Material Procedures.

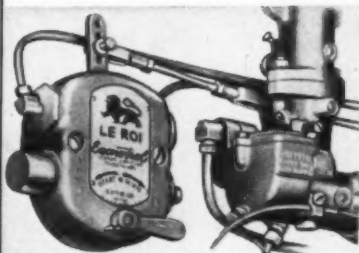
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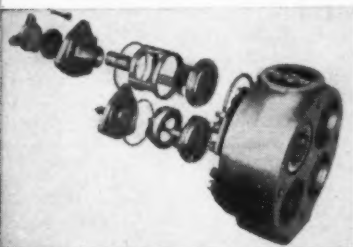


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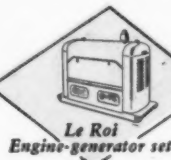
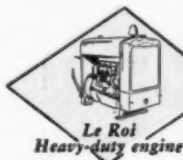
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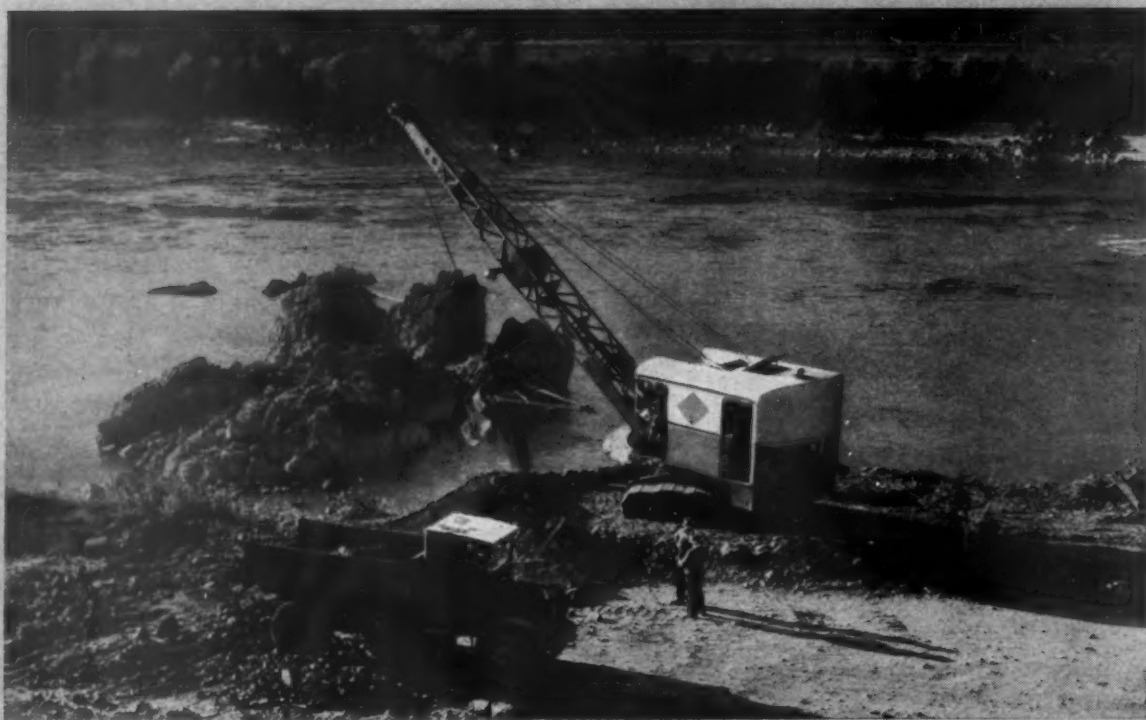
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## Catskill Thruway Gets Going

**Contractors credit winning of contract for first section to careful pre-bidding appraisal of job conditions**

**By H. K. Glidden**

**T**HE New York State Department of Public Works has embarked upon a very extensive thruway system, designed to provide the safest possible means of handling that state's rapidly expanding automobile and truck traffic. This program was discussed by B. D. Tallamy, Deputy Superintendent in his article, "New York State's Urban Program". (See R & S August, 1946).

When completed, the Catskill thruway, following along the west side of the Hudson River and traversing the legendary Sleepy Hollow and Rip Van Winkle country, will form a most important artery for north and south traffic. The first contract on this thruway was awarded to the Grandview Company of Mt. Vernon, N.Y., on

bids received in a June 26 letting. The \$429,609 contract covered grading and all necessary drainage structures for a 2.81-mile section in Greene County. This initial contract did not include any highway grade separation structures or pavement.

### High Design Standards

This state's thruway standards are exceptionally high from every point of view. Grades are being held to 3% maximum. No curve will have a radius of less than one-half mile. The thruway line in this area was carefully selected to utilize, as far as possible, unproductive farm lands. Grading will provide the roadbed for ultimate paving of two arteries, each with 37-ft. concrete pavement, separated by a 20-ft. turfed mall.

While the quantity of fill material was very nearly equal to that taken

from cut sections, Grandview was required to bring in granular material from borrow pits in order to provide a foundation having high stability and minimum settlement.

### Prospecting Paid Bid Dividends

Tony Mirabelli, senior partner in the three-brother Grandview Company, credits their winning this job to a very careful pre-bidding inspection of the site. Two rather uncertain factors were involved: the percentage of rock in one large cut, and the nearest source of suitable granular borrow material. Subsequent grading operations confirmed their exceptionally low estimate of the quantity of rock involved—something like a \$50,000 gamble here. The go-everywhere qualities of their jeep together with Tony's willingness to spend plenty of time prospecting resulted in their



★ Portable 21x8 ft. machine shop, housed in a rebuilt horse van. James Mirabelli, Grandview partner and project manager, used the jeep to good advantage in getting around over the job



★ A look-see inside Grandview's portable machine shop—well equipped with a lathe, grinder, press, work bench, and miscellaneous tools

locating a large gravel deposit about a mile from the job. Since such deposits are not common in this area, the discovery of this virgin source was very valuable to Grandview. The skeptical farmer, suspicious of a stranger wanting to buy an unproductive hillside, refused to sell, but he did give an option on a cubic yard basis at a very fair price. The end result was that Tony's ingenuity insured a profit for his company and at the same time put the farmer in the high income tax bracket.

### Strict Equipment Policies

The Mirabellis believe in owning all the equipment they need for any job they undertake. Tony explained that working conditions are too uncertain nowadays to do otherwise. What with an occasional strike, materials shortages, and unavoidable delays, he says the chances are too good that they will be forced to pay for a lot of time the equipment is idle. Again, he says he never rents out any of the best of his own equipment so he doesn't know why anyone else would either. Further, he feels that the only way to get work done is to own sufficient equipment, even though at times it has to lie idle, so that when additional equipment is needed to turn out work, it is

available and can swing into action on a moment's notice. As a result of this policy, this project stayed away ahead of the completion schedule. Tony said, "While it is true that the investment is rather large, it is worth it in that equipment owned is generally kept in good shape, especially when operating in cold climate, and above all it gives the contractor a satisfied feeling to see his own equipment pitch in and do the job."

### Job Control Slipping

Tony has an idea that between labor union practices and government regulations, the contracting business no longer is all that it used to be. He gives them both credit for good intentions, but he knows that it takes a lot more than intentions to get him a final estimate. In the first place, having bid close in order to get the job, he would like an even break in running the job the way he planned it. He feels that all contractors are losing control of their jobs and he thinks labor is short-sighted in pursuing any policy that keeps contractors from doing work fast and efficiently. Having become a successful contractor by plain hard work, he guesses that he is old-fashioned, but he still believes the happiest man is the one who does an honest day's work—no matter what.



★ Over \$30,000 worth of parts were carefully binned in this 10-wheeler parts truck which has 22x8 ft. floor space



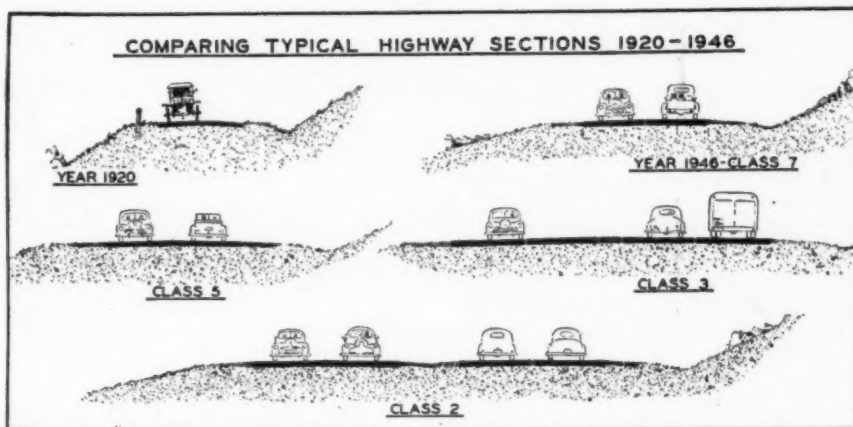
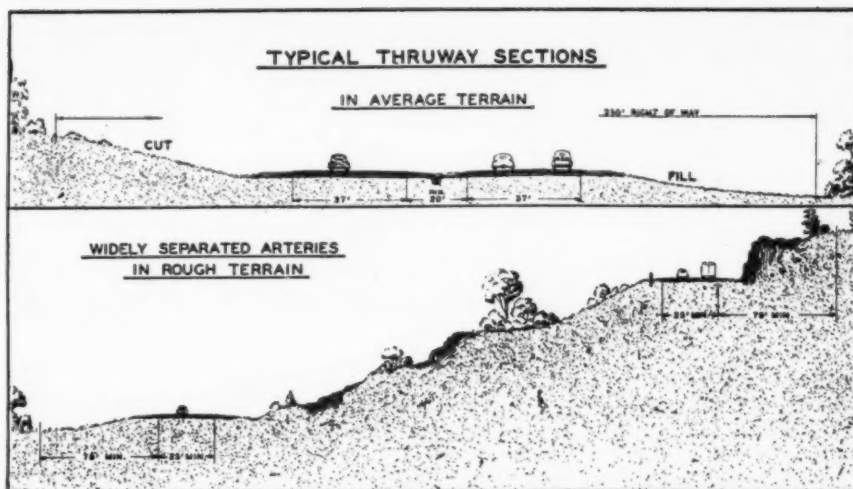
★ Late model bulldozer cleared right-of-way with very little outside help. Working on this steep bank required cutting a shelf in some instances

## Wage Laws Confusing

Minimum wage laws, as they exist in New York, puzzle Tony, even when his own lawyer, Wolf Cabari, tries to explain the situation to him. New York State had one set of wage rates, while the government has another. The Labor Department have represented one phase of government, the Wage Stabilization Board another. It seems that the labor unions had their own ideas on the subject, which was of most immediate concern to Tony Mirabelli. He just couldn't understand how it could be possible for New York State to prosecute him if he didn't and Uncle Sam to pyramid his income tax if he did; namely, pay what he had to in order to get anyone to work on his job. He doesn't think pirating labor is a good practice for the industry, but he wonders how else you get men to work on an isolated road job when they can earn the same, or possibly better wages and live at home. All in all, he isn't very happy to discover that, regardless of what the books say, there is no way in the world to tell how much money the company made in any given year until so many years later that most of the fun of spending it is gone. Somehow he got the idea that it is all sort of one-sided. He never seems to get any sizable refunds, but different agencies continue to find reasons for renegotiating or re-something-or-other to reduce the profits. It is good this breed of men love construction. He gets disgusted, but he won't sell out or quit and the country has an unlimited amount of work for his kind to accomplish.

## Standardized Diesel Motors

The Grandview Company has recently adopted one type of 150-hp. diesel motor as standard for several different pieces of equipment. Their experience shows this motor to be equally adaptable to certain size shovels, trucks, and rubber-tired earth



moving equipment. They say it has proved entirely practical and has simplified their servicing, maintenance and repair problems.

## Mobile Set-Up

James Mirabelli, the younger brother, was the project manager on the Catskill job. An ex-U.S. engineer captain, he has taken naturally to the use of surplus war equipment. Everything on the job was mobile, with proper and periodically scheduled servicing paying big dividends in a minimum of equipment repairs

necessary. Alex Comrie, the state's resident engineer, was assisted by junior engineer James Laurie.

## Bidding Still Close

The Grandview Company on the state letting of September 18, was awarded a \$777,975.50 contract for the construction of contract C.T. 46-1—Greene County to Ulster county line which is a continuation of the first contract known as contract C.T. 46-2. The next lowest bidder was S. J. Groves & Sons Co., of New York City, at \$780,232.00. (Engr's est. \$785,000)



★ Truck mounted equipment took care of servicing and repairs, on the job. Only a major breakdown rated a trip back to the machine shop, which was also truck mounted





★ This 2 cu. yd. shovel and a fleet of these late-model dump trucks are all equipped in the same type 150 h.p. diesel motor on which Grandview has standardized. The same motor is also used to power several other units of rubber-tired earth moving equipment. Result: Saving in maintenance, operation and repair costs

★ Grandview had specialized equipment to fit every type of condition encountered. Here, a crawler-type tractor helps load fast-moving rubber-tired equipment, down hill, on a long-haul section

★ A large rock cut on one end of the job didn't hold out for long against the team work of two compressors, several wagon drills, expert shooting, a 2-yd. shovel and four late-model 15 cu. yd. end-dump diesel powered trucks

★ Tractors pulling pans cut neat slopes

The nature of the new work is about the same with the exception that out of the approximate 400,000 c.y. excavation, 250,000 c.y. of it will be rock.

The interesting part of these two jobs is the fact that one contract runs into the other which makes it very handy for Grandview since the equipment and personnel can be shifted from one job to another without any difficult moving or hauling. Dom Mirabelli is to be the manager of this project.

### AED Annual Convention Feb. 13-15 at Chicago

The 28th Annual Convention of the Associated Equipment Distributors will be held Feb. 13, 14 and 15 at the Edgewater Beach Hotel, Chicago. It is expected that 1,400 executives of member companies from the construction equipment industry will attend.

The sessions will begin at noon Thursday, Feb. 13, and the convention will adjourn the following Saturday afternoon. The annual banquet is scheduled for the evening of Feb. 14. The 1946 AED Board of Directors will hold its last meeting also at the Edgewater Beach Hotel immediately prior to the Convention, and the 1947 Board will meet Sunday, Feb. 16.

F. B. McBath, Portland, Oreg., AED president, will preside. Leading

executives of the construction equipment and other industries will appear on the program as speakers. Names of the speakers will be announced in the immediate future.

The industry's adapting itself from wartime to peace-time status will be the basis for most of the problems arising for discussion at the convention. High on the list of subjects to be discussed will be the disposal of surplus government-owned construction and roadbuilding machinery. Business administration, financing and advertising will receive prominent places on the program.

Reports from the AED committees will be presented and recommendations from them will be considered for adoption by resolution. Election of officers for the coming year will be held during the convention.

The 1946 officers include: Mr. McBath, president; W. A. Danner, Hyde Park, Mass., executive vice-president; A. F. Garlinghouse, Los Angeles, Calif., vice-president; C. F. Halladay, Sioux Falls, S. Dak., vice-president; W. J. Kane, Winnipeg, Man., vice-president; W. W. Bucher, New York, N. Y., treasurer; C. F. Winchester, Washington, D.C., executive secretary.

Executive Vice-President Danner is chairman of the committee arranging the annual meeting program, and A. F. Sersanous, Portland, Oreg., is chairman Entertainment Committee.

### Commercial Signs Surveyed

Preliminary surveys of advertising signs erected along state highways have been completed and moves have been made to eliminate illegal or hazardous displays, according to Charles H. Sells, New York State superintendent of public works. The check-up disclosed existence of a considerable number of illegal signs and billboards along state highways and within highway rights of way, as well as substantial numbers of signs, outside of highway rights of way, which have been classified as "dangerous or objectionable to traffic," and are legally removable. Most signs found on the actual highway rights-of-way are privately owned and advertise some business conducted on the adjacent property.

All signs, situated outside of highway rights of way and on private property, which have been classified as being hazardous to the free flow of traffic have been listed as to location, type and objectionable features. Under a voluntary cooperative program agreements have already been reached with nearly all outdoor advertising companies, owning or operating such signs, to effect their removal or alteration. Other owners are being currently contacted to bring about similar cooperation.

# Two Additional Pavement Lanes for George Washington Bridge

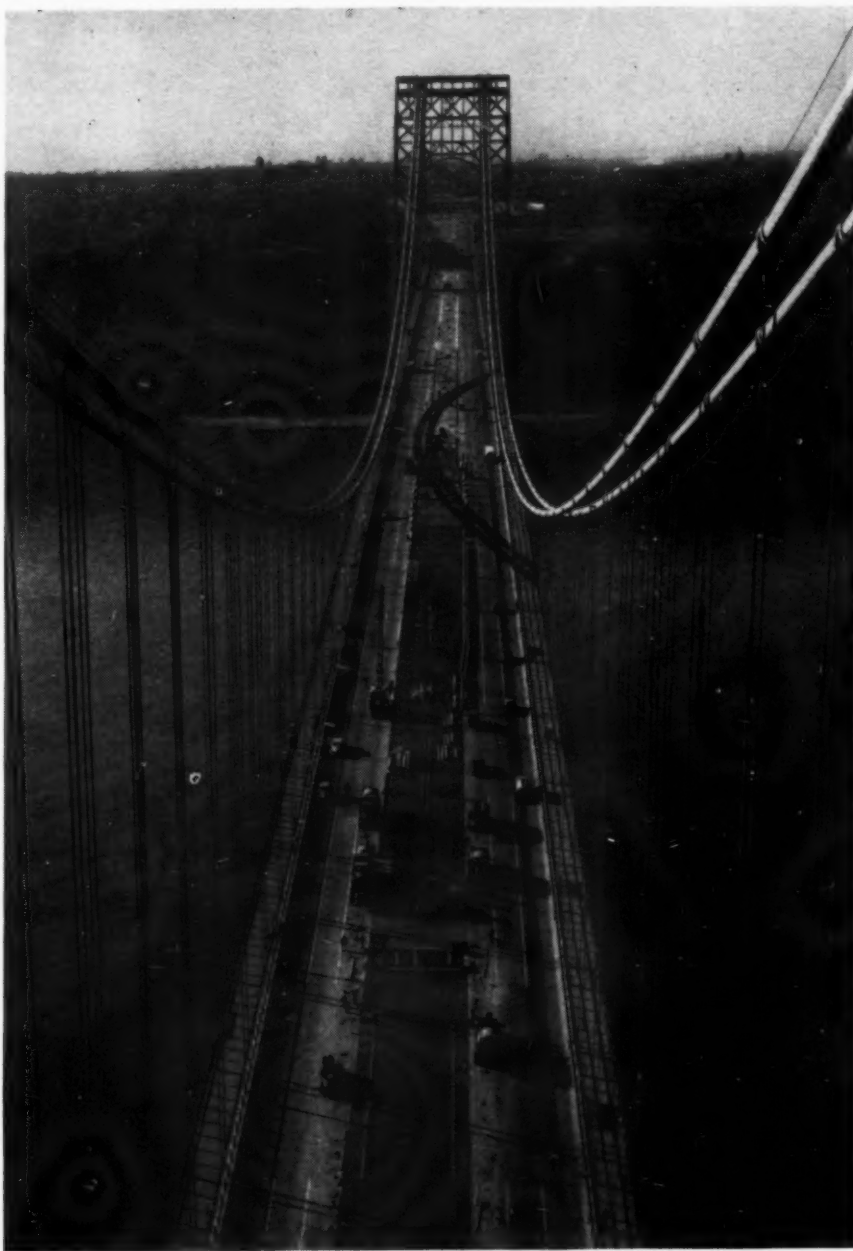
Poirier and McLane Corporation, contractors, employed special finishing equipment and placed ready-mixed concrete. Precast inverted mortar pans served as forms. Sag under dead load a consideration. Increases traffic capacity of world-famous 3500-ft. suspension span

WHEN the George Washington Bridge over the Hudson at New York City was completed and opened to traffic in 1931 only six of the eventual eight traffic lanes were paved. This was accomplished by paving a 3-lane 28'9" strip on each side and leaving a 32'6" unpaved center section.

That the two additional center lanes in the 32'6" center section would soon be needed was seen as traffic increased following V-J Day. In anticipation of a peak hourly traffic in 1947 a contract was awarded for the new lanes, and the contractor began work on October 17, immediately after the last heavy summer week-end traffic. The contract included paving the center area over the main and New Jersey side span, the New York side span having been paved earlier.

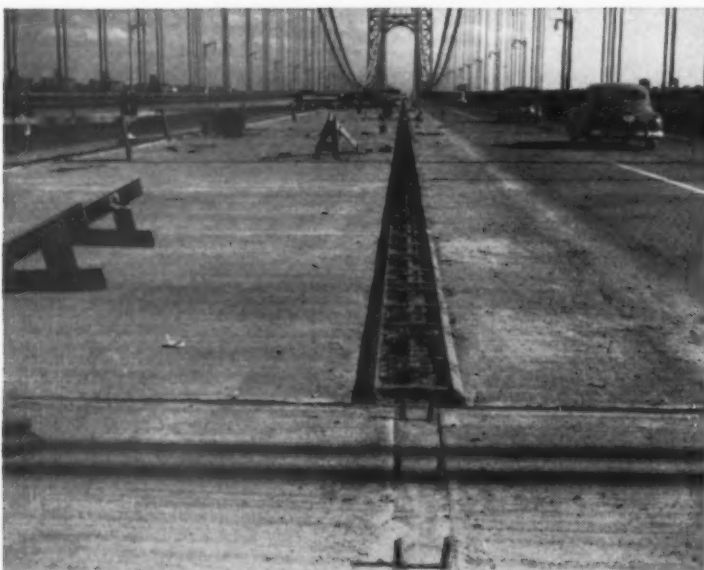
One of the major considerations in planning was the added dead weight and resultant deflections in the center and side spans during construction. Calculations made before paving was started indicated that a maximum downward deflection of 3.2 ft. would be produced approximately at the quarter point of the center span if the concrete slabs were placed from the tower nearest that quarter point towards about the center of the span. At the same time the other quarter point would rise about 2 ft., resulting in a differential elevation of about 5.2 ft. The actual deflections came within 8% of these figures. The main span is 3500 ft. between towers, the New York and New Jersey side spans are 650 and 610 ft., respectively.

The total roadway width out to out of curbs is 90 ft. The slab is a composite design made up of 6-in. bulb beams, 15 in. on center with  $\frac{1}{2}$  in. dia. spacers and reinforced-concrete so placed as to arch between the flanges of the bulb beams and to provide a 2 $\frac{1}{2}$ -in. cover over the tops of the beams. The arches thus formed



Port of New York Authority photo

★ Looking from the top of the New York side tower of George Washington Bridge during recent center-lane paving operations



★ (Lower right): Details of the floor system with precast lightweight concrete "pans" set on the lower flanges of cross beams to act as forms for the pour. (Upper right): Freshly finished concrete. Note anchors for the concrete barrier curbs which separate the two new lanes from outer lanes. (Lower left): How barrier curbs were formed. (Upper left): Paving operations in full swing near center of main span

by the concrete are  $5\frac{1}{2}$  in. thick at the crown and  $8\frac{1}{2}$  in. thick at the haunches where they rest on the bulb beam flanges. The reinforcing steel is made up of  $\frac{1}{2}$  in. dia. rods, 6 in. on center laid transversely across the tops of the 6 in. bulb beams and  $\frac{1}{2}$  in. dia. rods, 15 in. on centers longitudinally.

Concrete, with air entraining ingredient added to give 3% air by volume, was used. Special care was taken to maintain a uniform slump and follow other rules for quality concrete. The concrete mix specified 7 bags of cement per cu. yd. and required 174 lb. sand and 275 lb. crushed stone per bag of cement.

After giving considerable study to the relatively difficult task of stripping forms from the underside of the completed slab, it was decided to use precast mesh-reinforced concrete forms of inverted pan shape as detailed in the accompanying figure. These forms were cast to dimensions of 13 by about 60 in., with  $1\frac{1}{2}$  in.



★ Air entraining concrete of standard mixture design was internally vibrated ahead of the finisher, special care being taken to see that the concrete was worked well around the structural members of the floor system enveloped



★ Showing the special finishing screen, which places the full 28' 9" width in one operation

wall thickness and a 3-in. trough depth. Light-weight cellular aggregate was used. The reinforcement consisted of 4x4 in. No. 10 wire mesh.

Transverse expansion joints of pre-moulded cork at 60 ft. intervals were made to coincide with joints in abutting pavement and also with expansion joints in the existing steelwork of the floor system.

### White Cement Barriers

As part of the paving contract two lines of low, cast-iron-shod concrete separation or barrier curbs were specified to be placed in such a manner as to divide the two new inner lanes from the three outside lanes on either side. These white cement barrier curbs were cast over anchor bolts using simple forms as pictured.

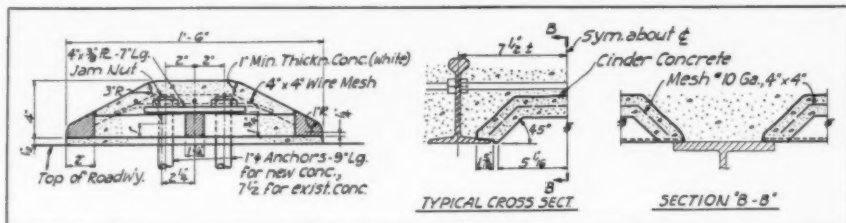
Construction involved few unusual difficulties. Ready mixed concrete was either chuted directly to place or transferred in carts. Concrete was internally vibrated. Specially adapted wide-span strike-off and finishing equipment was employed followed by burlap curing.



Port of New York Authority photo

The Poirier & McLane Corporation completed the concreting operation in about five weeks, as part of a \$340,000 contract which included paving, curb and electrical work. The project was designed and supervised by The Port of New York Authority, which owns and operates the bridge.

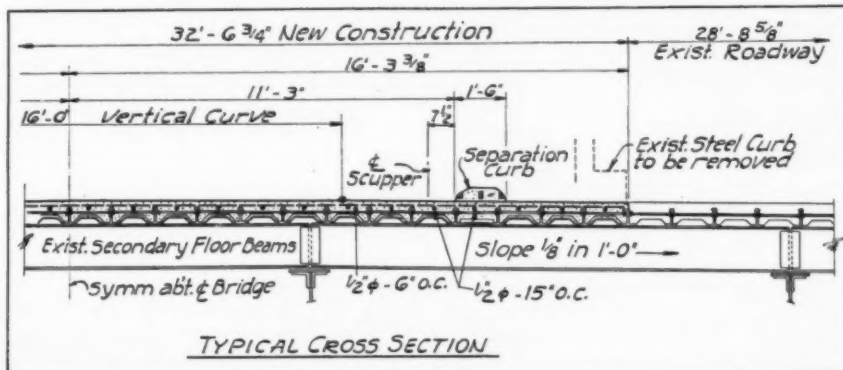
★ Trundling ready-mixed concrete into place over temporary wood platform



★ Details of the precast inverted pant-type concrete blocks which were used as forms and left as part of the pavement

★ Details of floor slab in relation to the floor system of the George Washington Bridge

Preliminary steps are being taken by legislative committees in ten of the far-western states whereby legislation will probably be introduced at the coming sessions of legislatures in those states to require localities in such states to channel applications (Form APA 1624) for Federal-aid for airports through state aviation authorities. Doubtless, similar legislation will be enacted in other states, but so far definite steps along these lines have been confined to the far-western states. Already, Wyoming has enacted legislation which requires federal approval.



★ How water was delivered for wetting cloth curing cover



★ A power track bolt press, set up in the equipment yard midpoint on the job, was part of Rardin Bros.' equipment for cutting down time to a fraction

**Hollinger-Davidson Co.  
with Rardin Bros. on  
U.S. 40, Ohio**



## Contractors at Work

★ A truck crane was indispensable on this job. Here it is operating a 2000-lb. skull cracker to break up large rocks in lieu of secondary shooting. An 8-ft. length of double chain between the ball clevis and the hoist rope tripled the life of the rope, according to the Rardin men



THE year 1946 may have been a slow one for bridges and housing but many an earth and rock highway grading job rolled at something like real speed. One of these was to be seen on U. S. 40 just west of Cambridge, Ohio, this past season. Here Hollinger-Davidson Company, of Akron, held forth as the contractor on a 3.85-mile section of divided highway. The contract was let in April, and by year's end most of the 700,000 c.y. of grading had been cleaned up, paving to start early in '47. And about time! Now one of these days travelers along the National Turnpike will have just that many miles less cussing of ancient alignment and narrow, worn roadway; and can enjoy another taste of the modern construction that will one day traverse the entire state and link with similar construction in Indiana. The job is being graded out and structures built for a 4-lane divided highway, and only one side paved for now.

These photos, taken in August, show grading in full swing. Much of the equipment shown was furnished by Rardin Bros., also of Akron, whose outfit performed the grading part of the contract. Structures were subbed to Minuez & Skemp of Millersburg, O.

Clarence Jay is project engineer for the Ohio department of highways.

Not pictured this trip is the work of drainage and culvert installation, structures or concrete paving.

★ Bar seems the p joying old fa to con shorin trucks hill a right-

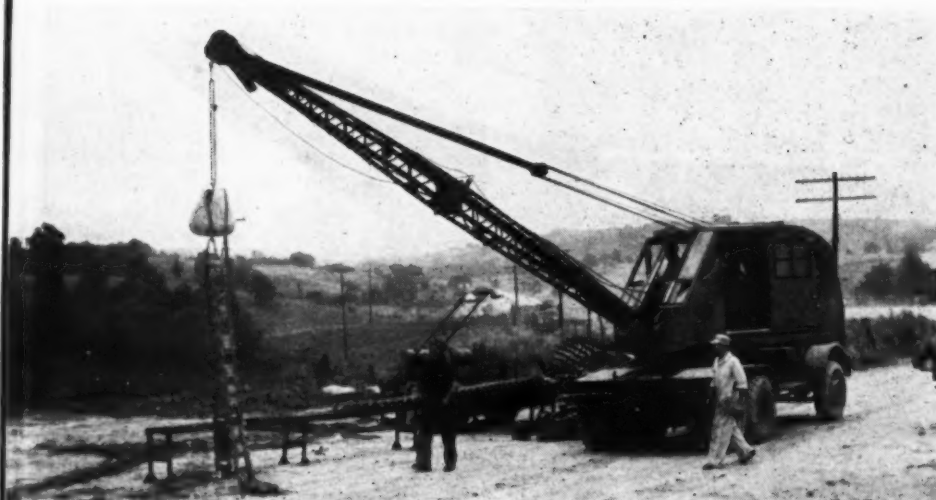
★ A spanking new 2-yd. shovel and 7 wagons took rock out of the large cuts



### Grading Outfit

*Principle Equipment Used on this 700,000 c.y. Job*

- |                                    |                                 |
|------------------------------------|---------------------------------|
| 1 Lorain 2-yd. truck crane         | 1 Internat. TD 14 dozer         |
| 1 Michigan ½-yd. truck crane       | 1 Internat. TD 18 dozer         |
| 1 2800-lb. skull cracker           | 3 Internat. TD 18 tractors with |
| 7 Euclid 10-yd. bottom-dump wagons | Bucyrus-Erie 8-yd. scrapers     |
| 3 Le Tourneau Super C pulls        | 2 Gallon graders                |
| 1 D8 Caterpillar tractor,          | 1 Leroy 315 cfs. compressor     |
| Le Tourneau dozer (snatch)         | 1 Cleveland rock drill          |
| 2 D7 C'pillar tractors (dozers)    | 1½-ton Ford grease truck        |
| Miscellaneous shop equipment       | 3 pick-up trucks                |



★ The rooter on this project was a bit undersize for the tough clay and shale encountered. Weighting with a heavy casting helped

★ Tractor tracks needing overhauling were handled by the truck crane, shown here lifting a set of crawlers onto the bed of the power track bolt press

★ Barns are as scarce as houses, it seems, and this perfectly good barn in the path of the new alignment is enjoying its maiden trip away from the old farm. A private contractor was put to considerable ingenuity to improvise shoring, skids and rollers so that two trucks could inch the structure over hill and dale along the partly graded right-of-way





## Partial Bid Details on 3.87-Mile Million Dollar Expressway Section, U. S. 40, Ohio

Bids on project pictured in accompanying photographs include clearing, heavy grading, drainage, several "over 20 ft." structures, and concrete paving.

(1) Hollinger-Davidson Co. awarded contract April, 1946.

Other bidders in tabulation (totals not shown):

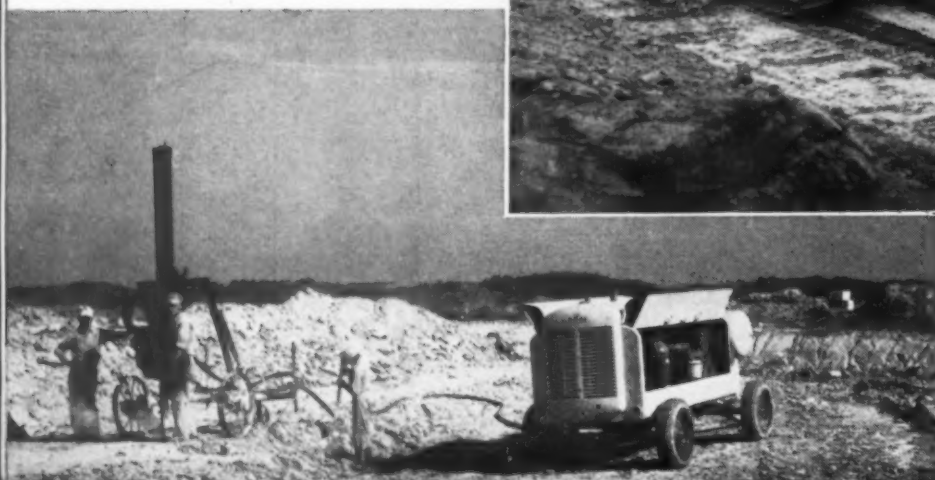
- (2) Nick Cenci & Sons, Columbus, O.
- (3) Lewis-Frisinger Co., Ann Arbor, Mich.
- (4) Ralph Myers Contracting Corp., Salem, Ind.
- (5) Frank Mashuda, Milwaukee, Wis.
- (6) W. H. Ringwald & Sons, Chillicothe, O.
- (7) A. J. Baltes, Norwalk, O.

Item and Quantity (Partial List)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
689,416 cu. yd. rdway. excav. (unclass.).....	\$ 0.50	\$ 0.55	\$ 0.55	\$ 0.47	\$ 0.58	\$ 0.475	\$ 0.62
1,750 cu. yd. channel excav. ....	1.00	1.00	0.80	0.30	0.50	0.75	2.00
25,207 lin. ft. remova. and disp. of exist. conc. curb. ....	0.10	0.20	0.12	0.08	0.05	0.05	0.10
1,185 sq. yd. remova. and disp. of exist. conc. pave. ....	0.50	0.25	0.50	0.45	0.40	0.40	0.50
20,810 sq. yd. remova. and disp. of exist. brick wear. course..	0.40	0.27	0.40	0.45	0.15	0.20	0.37
2,987 sq. yd. remova. and disp. exist. conc. pave. ....	0.40	0.25	0.50	0.45	0.30	0.40	0.45
134 units remova. trees and stumps.....	10.00	25.00	20.00	12.00	5.00	5.00	15.00
3,021 M. gal. water (estimated).....	3.00	2.50	3.00	3.50	4.00	3.00	3.00
1,408 lin. ft. 12" corr. metal pipe.....	3.30	2.50	1.50	2.25	2.00	1.75	2.20
2,637 lin. ft. 12" rein. conc. pipe.....	2.50	1.60	2.50	2.50	2.00	2.90	2.35
1,792 lin. ft. 12" corr. metal pipe.....	4.30	3.80	2.40	2.55	3.00	3.00	2.30
1,131 lin. ft. 18" vit. sewer pipe.....	4.10	1.50	3.00	3.10	3.00	3.60	3.50
1,752 lin. ft. 12" ext. qual. drain tile.....	2.00	1.50	1.40	1.50	1.50	1.55	2.25
662 lin. ft. 12" ext. qual. drain tile.....	3.00	1.50	2.50	3.00	2.75	2.40	2.40
3,002 lin. ft. 4" ext. qual. drain tile.....	1.40	0.75	1.30	1.85	1.00	1.25	1.40
17 units Stan. No. 1-2B catch basins.....	100.00	150.00	95.00	100.00	90.00	100.00	125.00
65 units Stan. No. 3 catch basins.....	200.00	235.00	215.00	250.00	200.00	215.00	225.00
16 units Stan. No. 7 side ditch catch basins.....	60.00	100.00	50.00	85.00	40.00	40.00	75.00
744 sq. yd. Type B riprap.....	4.50	4.00	3.50	5.50	6.00	5.00	4.00
461 sq. yd. Type A riprap.....	4.50	6.00	3.00	5.50	4.00	4.00	5.00
451 sq. ft. 4" conc. sidewalks.....	0.35	0.30	0.30	0.40	0.35	0.50	0.30
1,115 lin. ft. paved gutter.....	4.00	3.50	4.50	4.50	3.00	5.70	5.00
830 lin. ft. guard rail.....	1.30	1.50	1.50	1.60	2.00	1.75	1.80
2,386 cu. yd. side approaches.....	3.50	4.00	3.50	3.00	3.60	3.85	3.50
370,000 sq. yd. seed. and protect. rdway. areas.....	0.08	0.05	0.07	0.085	0.07	0.07	0.07
8,736 lin. ft. stand. guard rail.....	1.40	1.25	1.40	1.40	1.50	1.40	1.65
1,846 sq. yd. sodding.....	1.00	0.75	0.60	0.60	0.60	0.50	0.75
6,610 cu. yd. class. embank. material.....	3.00	3.00	2.75	3.00	3.00	3.00	3.60
334,662 lb. agricu. ground limestone.....	0.025	0.015	0.02	0.02	0.02	0.02	0.015
103.5 tons calcium chloride.....	35.00	35.00	30.00	30.00	30.00	32.50	40.00
5,175 cu. yd. traf. compact. surface.....	3.50	3.50	2.75	3.50	3.25	3.50	4.00
<b>Pavement</b>							
211 sq. yd. 8" pavement.....	3.20	3.50	3.40	3.92	3.50	3.85	4.00
54,188 sq. yd. 9" reinfd. pavement.....	3.50	3.25	3.45	3.87	3.50	4.25	3.50
16,654 lin. ft. Type 4 comb. curb and gutter.....	1.50	1.40	1.25	2.25	1.50	2.22	1.50
159 sq. yd. 9" reinfd. conc. appr. slab.....	9.00	7.50	7.00	5.00	8.00	9.50	7.00
593 lin. ft. Type 4-A conc. curb.....	0.40	0.50	0.50	0.30	0.60	0.30	0.40
<b>Structures 20 Ft. Span and Under</b>							
3,327 cu. yd. excav. for struc. (unclass.).....	3.00	3.00	3.00	3.00	2.90	3.00	4.00
1,443 cu. yd. Class C conc. for struc. ....	37.50	34.50	34.50	34.50	33.00	40.00	42.50
156 sq. yd. Type A waterproofing.....	0.50	1.20	1.20	1.20	0.30	1.00	0.50
701 sq. yd. Type B waterproofing.....	2.00	2.40	2.40	2.40	1.80	2.00	2.50
203,918 lb. reinforcing steel.....	0.07	0.075	0.075	0.075	0.065	0.075	0.07
180 lin. ft. creosoted timber piling.....	2.50	3.50	3.50	3.50	2.50	3.00	3.00

★ A tow-type rubber-tired compressor (315 cfs.) served wagon drills and jack-hammers



★ The now-familiar snatch bar, manipulated by cable control by the tractor operator, saved time and manpower on scraper work. Three self-powered scrapers worked larger cuts





★ Three 8-yd. scrapers—also new, believe it or not—with heavy tractors scalped the steep hills, took care of short-haul yardage

★ Not elegant, but ample for this project—Rardin's field shop. Concrete floored and equipped with modern power bench tools, this shop made possible overnight tear-downs and one-day overhauls. The parts and tool shack were set off a truck at the right

### A.G.C. Objectives and Ideals

The A.G.C. has increased the prestige of the general contracting profession through adherence to the objectives and ideals set forth in the by-laws as the special purposes of the association.

1. To make membership in the association a reasonable assurance to the public of the Skill, Integrity and Responsibility of its members.

2. To maintain the standards of the contracting business at the level necessitated by its quasi-professional character and to establish members of the association in the public mind as contractors who fulfill their obligations in full faith.

3. To provide methods and means whereby members may avail themselves of the greater power of combined effort through the association, acting as authoritative body, in securing just and honorable dealings from the public whom they serve.

4. To promote cordial and co-operative relations between general contractors and those with whom they deal or have contact in construction.

5. To seek correction of injurious, discriminatory or unfair business methods practiced by or against general contractors.

6. To place the business risks assumed by general contractors as nearly as possible on a parity with the risks assumed by other industries of production.

7. To protect the legitimate market for the services of general contractors against encroachment by governmental or other agencies.

8. To eliminate waste and reduce construction costs through research and through co-operation with other agencies of construction.

9. To eliminate as far as possible the occurrence of injury and death to construction workmen.

10. To establish various standard contracts and to co-ordinate such contracts with each other so that the respective interests of owners, general contractors, subcontractors, manufacturers and dealers may be properly protected.

11. To foster a reasonable and proper credit structure for the contracting industry.

12. To secure uniformity of action among the individuals forming the association upon such principles as may be decided upon, from time to time, as being for the good of the industry as a whole.

Reprinted from *The Construction Advisor*.

### A 5,000,000-Lb. Testing Machine

A 5,000,000-lb. universal-type testing machine is to be installed in the

new engineering laboratories of the U.S. Bureau of Reclamation near Denver, Colo.

Specifications call for a vertical, hydraulic testing machine with a capacity of 5,000,000 lb. in both compression and tension. The new machine will accommodate compression or tension specimens up to 32 ft. long and will permit transverse testing of specimens up to 50 ft. in length. The completed machine is expected to approximate 70 ft. in height, about 20 ft. of which will be below floor level.

The testing machine will be equipped with a vertically movable, power-operated platform from which laboratory personnel can work, automatic graphic devices for recording load and elongation, and an intercommunication system with four stations: the pit, platform, control cabinet, and testing engineer.

The machine will be used principally in testing large drill cores from concrete structures, laboratory fabricated concrete specimens, structural steel, reinforcement steel, scale models of engineering structures, and will be adaptable to testing a variety of other construction materials.





## ★ Road Taxes Need a Raise, Too

Hikes in the gasoline tax rate are likely to be sought in twenty-four states in the coming year, according to a legislative summary made by the National Highway Users Conference. Nine states anticipate increases in vehicle registration imposts. This is as it should be and must be, if a nation on wheels is to finally emerge into the prosperity and better life we know is there waiting.

Individuals and organizations, many of them powerful and most of them sincere, will campaign to prevent such increases. Where a state needs more road funds to carry out a road program, part of the job of highway leaders is to marshal the fact and see that they are placed before the

public to meet such opposition. The facts are there, dramatic facts, but they require digging out. Facts on accidents and the safety that comes with modern road design. Facts on the astronomical economic loss from congestion, and the profit-earning capacity of well designed highway facilities. A rich lode of facts awaits the spade and the skilled interpreter in every state.

Municipal taxation toward more funds for long-needed urban highway construction, is another matter for action in 1947. Many such proposals will be introduced. But so will a measure to specifically prohibit cities from levying municipal taxes on vehicles or motor fuel. Broader reci-

procity measures to aid inter-state highway transportation are in prospect. Most states will give serious consideration to the minimum standards for motor vehicle sizes and weights, as adopted by AASHO. Legislation aimed at greater highway safety can be expected.

Legislatures will convene in 1947 in all but four states. They will consider matters of vital interest to highway users. Through sound facts and far-sighted testimony highway leaders have an opportunity to contribute to road progress, and in some states the legislative job is more important than any slide rule work we can think of.

## ★ Why a Professional Engineer Classification

By H. K. Glidden

Many an engineer finds time to stop and take inventory of his professional standing only after being out of school a few years, and then realizes that he is up against as tough a proposition as even the lawyers might think up. We have in mind the often unfair and meaningless tests an engineer must pass in order to become registered as a professional engineer. This condition is particularly applicable to some of our ex-army engineers and seabees. The difficulties to be encountered vary widely in degree depending on the laws prevailing in the state in question. By and large this can also be very unfair and is in effect discriminatory.

Common practice finds the newly-graduated engineer spending his first few years out of school banging around over the country, giving every task the old college try. The settings for many such tasks are in the most out of the way places imaginable. Somewhere along the line he gets married and being prolific he and his wife continue to emulate the gypsies until their "oldest" is ready to start school. He hates office work at first,

but after a year or so is well softened up, has grown a little heavier, has joined the Elks, and confines his field work to an occasional inspection trip. Being a white collar worker now, he starts to size up his professional stature. Some of the older men, who as likely as not got in under the grandfather clause, have their professional registration certificates hanging in frames over their desks. One would look good over our friend's desk, too, so he starts inquiring about how you get one. What a rude awakening! He's been out of school for years doing a specialized job—now they want him to take his final exams all over again and on such subjects as electricity, hydraulics, structural design, surveying, physics and chemistry. He knows that would have been a high hurdle even in his scholastic prime and an impossibility now, barring long and intensive review. Being human, he starts prospecting to see if he doesn't know somebody who has a drag with the board. Maybe yes... maybe no. You finish the story to your own liking.

If he has managed to set himself up as a consultant, been registered, and has prospered to a point where he

has clients in neighboring states, his troubles have just begun. It may well be that one or more of the state boards in the area of his opportunities, regardless of this engineer's standing with his clients or his home board, will expect him to take his professional engineer's exam all over again. The same applies if he finds it desirable to move from one state to another. If he is lucky, the state reciprocates with the state where he was first registered, otherwise it's a tough go.

We get the impression that any given state's policy on reciprocity is very likely to be affected too much by factors such as pride, jealousy, and snobbishness. State "A" may have very tough requirements, while State "B", has moderately easy but fair and adequate requirements. The result is that State "A" will not reciprocate with "B" because it feels "B's" standards are inferior. "B" in turn, will not reciprocate with "A" because it feels it is being high-hatted. Vary the circumstances to suit yourself and let your imagination go—you won't be too far wrong.

While we are a strong advocate of state's rights, we are a stronger advo-



cate of the rights of the individual. Our travels throughout the entire nation have failed to disclose any marked superiority in the brand of engineering practiced in one state over that of another. It seems to depend mostly on the amount of funds available for engineering. Reciprocity surely isn't meant to come in the category of high-tariff trade barriers even though it works out that way in many instances.

Engineering is no different from the other professions and, like medicine or law, is becoming more specialized every day. We will venture the opinion that, short of sheer genius, there is no such creature as a professional engineer. The men who are held in the highest regard in this mythical classification are actually very good engineering executives who rely on their specialists to work out the details. The chief engineer of a large engineering firm, a brilliant structural man, is a specialist on suspension bridges and is, we think, a little bit unhappy away from his chosen field. His broad experience, however, allows him to pass critical judgment on the work of any one of perhaps 50 specialists on his staff and out of the millions of dollars worth of work which passes over his desk—no suspension bridges. We will wager a goodly sum that he cannot pass the professional engineering examination for any one of several states we might choose unless he first wasted a lot of time cramming.

It is difficult for us to see how anyone can subscribe to the idea of asking a man with an engineering degree to take a written examination on any subjects other than those of a highly specialized nature. To do so is to ignore the increasing degree of specialization taking place in engineering and most certainly fails to take account of the efforts of the forty or so college professors who have a hand in every diploma issued. There is no doubt that the self-made man deserves a great deal of credit for his having literally pulled himself up by his bootstraps. His breed have contributed much to the accomplishments of most of the professions. However, if he chooses to enter the engineering profession by unorthodox means he should be required to take an appropriate number of written examinations; after all, his college-bred competitor had to do so.

We would like to suggest to the profession that it:

1. Discard the professional classification in favor of several more specialized categories corresponding to college degrees.
2. Accept an engineering degree from an accredited school as sufficient evidence of basic knowledge of engineering and specialized knowledge in the branch of engineering in which it was awarded.
3. Resort to written examinations only when the applicant does not have an engineering degree, or when the applicant desires to be registered in

a branch of engineering not covered by his degree.

4. For any one branch of engineering, have at most two written examinations; one covering basic engineering knowledge such as is gained in the first two years of college, and another applying specifically to the branch in question.

5. Adopt 3 grades; assistant, associate, and full engineer for each branch of engineering basing each grade solely on the number of years spent in actual practice of a particular branch.

6. Advocate and secure adoption of nation-wide legislation requiring all engineers, including those employed by the federal government, to be registered.

It is a big order and the subject of a lot of controversy, but engineering is a grand profession—deserving of better treatment than it has enjoyed so far. If you want to argue that statement, well, you must not have ridden out WPA days. The “ins” are in and we’ve stepped on the toes of a lot of them, but we don’t advocate a purging of the profession. We do advocate making it easy for the deserving “outs” to get “in”. Further than that we are in a hurry to see the whole thing get started, and are not unappreciative of the well-intentioned efforts of various engineering groups which are largely responsible for the progress made to date. We do, however, question the motives of some of the “ins”.

## ★ Small Bridges Still Problem

One vital necessity in 1947 is to make better progress in replacing inadequate small bridges. It was slow going this past year. A way must be found to get more steel and lumber and cement for this job.

Meanwhile thousands of obsolete structures continue to restrict traffic, and not a few of them to endanger lives. “Watch your bridges” is the warning sent out over Minnesota by that state’s commissioner of high-

ways, M. J. Hoffman. Reminding truckers that several bridges were seriously damaged recently, he urged haulers to refresh themselves on load-limit rules and special posted bridges, narrow bridges and those with less than 14-ft. clearances.

One bridge in Minnesota recently collapsed after passage of a heavy truck, blocking a railroad as well as the highway. In another case an over-width truck knocked the supports of

a railroad underpass three feet out of line. Truck loads failing to clear vertically are a common occurrence and the damage to all parties runs into tidy sums. In all the cases named by the commissioner, the trucker had decided to sneak through without a special permit.

Rigid permit enforcement, of course, is a continuing task, and not an easy one. But replacement of horse-and-buggy bridges is the big job.

## ★ Lets Have More Equipment Meetings

The equipment meeting in Washington, D. C., recently held by the Highway Research Board in cooperation with the American Road Builders was such a success that regional meetings of a similar character are planned. We say, the sooner the better. Equipment needs, utilization,

operation is the neglected side of the technology of road and street and airfield construction and upkeep. New equipment here on the way calls for a review of the whole problem of job efficiency, operator training, specifications. Equipment changes will even bring road design changes in some

instances, and affect policy on such contract considerations as job size, and time limit.

The main thing in holding equipment meetings is for contractors, engineers and manufacturers to be there together.

# Highway Research Meeting

**Traffic, economic and other functional problems of highway engineering continue to receive greater and greater attention in the Board's expanded program, along with physical research into soils and other materials**

**I**T IS well for the future of highway transportation that the big yet-unsolved problems of highway planning, design, construction, maintenance, and utilization are being tackled with new vigor.

We started to say all-out vigor, but that still doesn't characterize the program of the Highway Research Board, which with its splendid committee set-up and plan of national coordination could well be nurtured with still more funds than are now available for highway research. But, as Chairman Roger L. Morrison observed in addressing the general assembly in Washington, the Board's work was surprisingly little disorganized by the war, and activities and membership have emerged from the war bigger and better than ever.

## National Research Program

The Annual Meeting of the Board, Washington, Dec. 5-8, included such a crowded docket of papers and panel discussions that only a few random excerpts and highlights can be given here. The postwar program of the Board under Director Roy W. Crum was outlined by Associate Director Fred Burgraff, who announced that research correlation nationally is now a reality. The correlation program stemmed from an AASHO committee working with the Board in 1944, at which time the Federal Highway Act was passed earmarking 1½% of highway funds for research and planning. The headquarters staff now has six full-time engineers, representing the Board's departments. During the past year these engineers have contacted 875 state highway department staff members and hundreds of individuals in other organizations, including 69 colleges and universities. All states were visited from one to 7 times, averaging 2½ times.

Last August the Board wrote all state highway chief engineers, asking them to list problems on which further

research was considered necessary. For the first time engineers of 95% of the States have designated their research problems. Last April, staff members and officers of the Board met with department chairmen and established the following sequence of action:

(a) Revision of existing list of needed research projects to include those recently brought to light.

(b) Examination of revised list by

staff, to make preliminary allocation of projects to departments with notes of secondary interest of other departments.

(c) Submission of allocation to department heads and return to Director for final determination.

(d) Submission of appropriate sections to each department.

(e) Each department to hold meeting or otherwise discuss its list of projects.

(f) Departments to state problem in general for each item.

(g) Staff to prepare bibliography and critical digest on each problem as stated by departments.

All items to and including (d) have been accomplished and some of the Departments have completed (e) and are working on (f).

There were 810 separate items listed in the replies, representing an interesting and revealing pattern. These include the following subjects and replies:

Supporting value of subgrade soil, subbases and bases (29); design and spacing of joints (22); bituminous mixtures (19); concrete durability (18); curing concrete pavements and structures (15); design of flexible bases (15); pumping of concrete pavement slabs (14); soil compaction (14); method of evaluating soil stability (12); soundness test for concrete aggregate (11); stabilization of subgrades (11); pile foundations (10); bituminous resurfacing of old concrete (9); pavement performance surveys (9); organization and personnel (9); concrete mixes (9); movement of soil moisture (8); soil cement (8); traffic signs (8); air-entrained concrete for structures (8); design of slab for various subgrades (8); granular layers under concrete pavements (8); treatment of icy pavements (6); frost action (6); surface finish of concrete structures (6); welded steel bridges (5); tile underdrains (5); soil treatments and topping for subgrades (5); preventing and correcting slides (5); placing

## Phillips of Tennessee Heads AASHO for '47

C. W. Phillips, commissioner, Tennessee department of highways and public works, was elected president of the American Association of State Highway Officials at its annual convention, Los Angeles, Dec. 17-20. Other new or re-elected officers:

**1st Vice-president:** R. H. Baldock, state highway engineer, Oregon.

**Regional Vice-presidents:** Spencer Miller, Jr., New Jersey; F. Elgin Bayless, commissioner, Florida; W. W. Polk, chief highway engineer, Illinois; C. B. Shain, director of highways, Washington.

**Executive Committee:** R. H. Leavitt, commission chairman, Utah; Charles H. Sells, superintendent of public works, New York; F. R. White, chief engineer, Iowa.

**Treasurer:** G. H. Henderson, principal highway engineer, Rhode Island.

A summary of papers and discussions at the AASHO's successful and well attended Los Angeles meeting will be published in the February issue of Roads and Streets.



concrete by vibration (5); soil density and moisture content methods (5); aerial photography (5); maintenance repairs by asphalt jacking (5); traffic and zone markings (4); traffic density (4); shoulder stabilization (4); patching disintegrated concrete structures (4); guard rail (4); weed control (4); reinforcing steel in slabs (4); large culverts under high fills (4); economic design (3); design loadings of bridges (3); vibration of continuous girders (3); open steel grids for bridge floors (3); light weight metal for bridges (3); stability and flexibility of bituminous pavements (3); erosion control (3); earth pressure against walls and abutments (3); underground exploration by seismic methods (3); highway lighting (3).

Important in the Board's procedure is library research, and Mr. Burgraff made the point that this type of advance work is extremely important in surveying existing knowledge of a given subject, compiling bibliographies and thus aiding researchers in making the best of available time and funds on a proposed investigation. The Board is adding a full-time librarian at headquarters staff, and bibliographies will be given out after committee review. The possibility of micron reproduction of a large volume of bibliographical reference material, to expedite committee study, is being considered at this time.

A better, well rounded program of pure research into basic laws is needed for greatest long-range progress, and hence a closer relationship between highway departments and universities is sought.

### Maintenance Up 35%

From a progress report, committee on highway maintenance costs, J. S. Bright, Deputy Commissioner of Public Roads, chairman:

Total maintenance bill in 1941—\$203,000,000 for state highways, \$659,000,000 for all roads and streets (est.).

Common labor averaged \$0.46 per hour in 1941, \$0.65 in 1945. Light equipment operator pay averaged \$0.57 and \$0.79, respectively; maintenance patrolmen, \$0.59 and \$0.87. Average wage rise in four years, 42%.

Material costs rose in the period 8% to 42%, averaging 30%.

Equipment rental rates rose less, 29%, due to continued use of old machinery.

### MacDonald's World View

Thos. H. MacDonald, Commissioner of Public Roads, at the general assembly took occasion to read a report from a member of an engineering delegation recently in this country from India. Here to study American methods, the visitors cited several significant benefits—notably a better appreciation of the need for laboratory control of road construction, and a new awareness of the part that modern power machinery plays. Our Indian friends pointed out that hand labor as now used in India and many other parts of the world, is so slow that construction of modern roads at the rate needed is utterly impossible, regardless of price.

Commissioner MacDonald observed that we take for granted the basic role of highways in modern life, and hence have failed to "sell" that role to the public, to industry, and to associations of users whose main concern often has been to short-sightedly restrict gasoline taxes or other revenues. Highway transport, "necessary as the air we breathe", is the hope of the world's underfed millions, and its development will lead to conditions which will foster stabilization of population, betterment of physical vigor, spread of education and other benign influences.

### Materials and Construction Committee

The Board's Materials and Construction Department, reported on by Prof. C. H. Scholer, Kansas State College, has been drastically reorganized and will have new committees

Apologies once again to the authors of excellent papers not listed or reviewed herewith. This article covers a strictly random selection of meeting sessions and talks we were able to cover.

under four divisions: concrete, under Stanton Walker; bituminous materials, Prevost Hubbard; general materials, Ken Woods; construction, Elmer Lawton. Fourteen subjects have been assigned to project subcommittees. The department's purpose is to be informed on latest developments in materials and construction methods, keep in touch with current research, summarize and correlate new research projects, and study the need for further research both basic and applied. Prof. Scholer said that highway departments are fumbling in some instances with problems needing immediate solution but requiring years of further study. Meanwhile serious lack of agreement on fundamentals of highway construction continues to exist among leaders who make decisions and back them stubbornly.

The equipment meeting held jointly in Washington by the Board and ARBA was described by H. F. Clemmer, who said that regional meetings are planned to bring contractors, engineers and manufacturers together on industry needs.

### Compaction Methods

Four highway departments this year plan field tests to check fluctuations in the moisture-density relationship of compacted soils over a 12-month period. In North Carolina, according to L. D. Hicks, 105% modified AASHO density reading have been found in subgrade soils, showing the progressive effect of traffic compaction. [A report summarizing state highway soil compaction specifications will be published in a later issue of **ROADS AND STREETS.**]

### Better Equipment Due

Developments expected in concrete road equipment were touched on by Charles Allen of Ohio. This includes new vibratory power subgrade compacting equipment, a new accessory for bin compartments that will help prevent segregation, and light paving and finishing units for widening work. The possibility of pavers larger than 34-E was noted, an obstacle being excessive weight on the grade. Continuous concrete mixing devices were mentioned, but more interest was shown in improved central concrete plants, needed particularly with air entraining concrete,



and in ready-mix. Also noted was the trend toward larger paving contracts, which has a definite bearing on equipment design and economics. Improved superelevating screeds, for adjusting the cross-section around curves, are expected on the market.

A discussion of asphaltic equipment, under George Dent of the Asphalt Institute, brought out an expressed need for larger capacity dryers in connection with hot mix plants. Also a need for small portable dryers of 20 to 50 c.y. daily capacity for maintenance work.

In the earth moving field users can expect to see a trend toward faster, bigger capacity self-powered scrapers faster swing and loading cycle in excavators, better traction in these machines; also improved material loaders; larger and heavier tractors; rubber-tired vibratory rolling equipment; better units for trenching and backfilling to supplement excellent hand tampers now available.

The broad trend is toward more specialized equipment, and the big need will be to learn to select and utilize such equipment and to properly train operators. The Construction Equipment Committee of the Board hopes to write specifications for road equipment that will not stifle design progress.

### Navy's Airfield Evaluation

The work of evaluating wheel load capacity of flexible pavements on Navy airfields was presented by L. A. Palmer of the U. S. Navy Bureau of Yards and Docks. Begun before the war, this work has taken in some 40 fields with hundreds of plate tests.

Like other evaluation programs, the Navy's has the purpose of bringing about better design procedures as well as checking safe load limits of existing fields. Mr. Palmer noted that much emphasis has been placed on pavement *thickness*, whereas *quality* is the real problem.

Conclusions on the Navy's program:

1. Few airfield subgrades were compacted initially to anywhere near the desired density, due to wartime haste.

2. A progressive increase in subgrade density has occurred under traffic on fields observed since 1941 and 1942.

3. The relative density of the top 9 in. of subgrade below flexible pavements observed, varied from 86% to 104% Mod. AASHO, with relative density at least 90% at 16 fields. Under concrete at 6 fields, the range was 79% to 98%.

4. The average densities of sand subgrades under flexible pavements at three air stations exceeded the maximum figure obtainable with the modified AASHO procedure—111% in one case! Such high densities seem to be developed under plane traffic acting through the flexible surface, increase with traffic use.

5. Tire pressure as an important load bearing consideration was emphasized; higher pressures mean lower safe pavement capacity.

6. Subgrade moisture conditions were found to be more favorable than those frequently assumed in design on the basis of the CBR test.

7. No effect of the subgrade moisture content on the bearing value has

been apparent in this program thus far. Pavement load capacity increases subgrade bearing value, pavement thickness and base density.

8. Computed angle of spread of load through flexible pavements varied from 0% to 48%, ranging usually between 20% and 45%. There was a reasonably good agreement between actual and theoretical unit loads required to produce 0.1 to 0.2 in. settlement.

### Soil-Aggregate Mixtures

Comparison of strength characteristics of soil-aggregate mixtures: E. J. Yoder and K. B. Woods, Purdue University, on this subject indicated that for a given gradation of aggregate there is an optimum soil content at which maximum densities are obtained. The optimum soil content where strengths are concerned is somewhat less than that indicated by compaction tests. Maximum densities do not necessarily mean maximum strengths in comparing soil-aggregate mixtures at near optimum soil content. Soil plus crushed stone rates highest in densities, followed by soil-gravel, soil sand, and soil-dune-sand, in order named.

Soil-gravel mixes had maximum density with approximately 10% soil, maximum strength with 7% soil; for soil-stone these values were 9% and 7%; for soil-sand 10% and 13%; for soil and fine sand 40% and 25%.

Among the conclusions are that optimum soil content decreases as compactive effort is increased, aggregate breakage being a factor; for comparable densities, strengths are lower with over-optimum soil than under-optimum; a small amount of soil is a desirable additive to a base course aggregate, for durability and strength.

### Capillary Rate Test

The outlook is not promising for developing a test that will anticipate the rate of rise in capillary soils, according to a paper by Kenneth S. Lane and D. E. Washburn, U. S. Engineer office, Providence, R. I. A report on tests using a capillarmeter and soil-filled tubes was read by E. F. Bennett of New York in the absence of the authors. The amount of rise, however, was recognized as the most important index for soils, and measurement of total rise is recommended by means of open tube tests on clays and similar data on coarser soils.

### Vibratory Rolling

Vibratory and slow repetitional loadings as a means of compacting soils continues to be a live subject.

(Continued on page 94)

### More Funds Needed

Threaded through the recent research sessions was the spectre of inflation.

And also evidence that highway leaders are turning into the kind of salesmen highway programs need today.

Maintenance costs are up—see T. H. Bright's summary. Soaring construction costs, of course, need no mention, but their effect of causing severe bob-tailing of programs was told by such speakers as Charles S. Noble, New Jersey state highway engineer. Mr. Noble and R. E. Jorgensen, planning director, noted that highway construction and in some cases maintenance in their state began to fall behind long before the war. Today the funds in sight from existing revenue

sources are far short of the accumulated need. New Jersey's 5 year program, involving a large expressway mileage, will cost 99 millions, while only 31 millions will be forthcoming unless the state legislature acts.

Highway needs of a state must be compared with anticipated revenues in a more thorough and scientific manner than in the past, said Mr. Jorgensen, in order to determine what additional funds must be sought. Highway planning survey data and other telling facts are marshalled for a selling campaign directed at the New Jersey legislature. The campaign will make all-out use of diagrammatic and other visual means of presentation.

# Reflector Beads

## Widely Used in Michigan's Pavement Marking Program

**This article summarizes Michigan's no-passing, cross-walk, railroad crossing, parking and other marking practice, which conforms with anticipated national standards. Also gives details on the extensive use of reflectorizing beads and an excellent explanation of the underlying principle that has brought reflectorizing materials to the fore**

**By Charles M. Ziegler**

Commissioner, Michigan State Highway Department, Lansing

**I**N the Michigan State Highway Department 1946 pavement marking program, on many of the major routes selected from the trunk line network, the new national standard as determined by the Joint Committee on Uniform Traffic Control Devices was followed. That is, on two-lane pavements on both concrete and bituminous surfaces, in both rural and urban areas, the centerline shall consist of a 4-in. wide broken white line; the centerline shall be placed in the exact center of that portion of the pavement used to separate opposing traffic flow.

"No Passing Zones," designating beginning and end of zones on vertical and horizontal curves where restricted sight distance creates a hazard, are marked with a continuous 4-in. yellow barrier line to the right of the centerline or lane line, throughout each restricted area.

Cross Walk Boundaries are marked at all intersections whenever there is considerable pedestrian movement. These lines definitely indicate the areas in which the motorist must relinquish the right of way to the pedestrian, and likewise the right of way the pedestrian must relinquish to the motorist. Cross walk lines are of solid white, four inch barrier lines.

Reflectorized Stop Lines are used when intersections are protected by stop signs or traffic signals to stop vehicles somewhat in advance of the cross walk line and thus prevent interference with orderly pedestrian flow. Lines at least 2 ft. wide are placed about 4 ft. in advance of the

nearest cross walk, and should extend from curb to centerline.

**Obstruction Markings.** Yellow pavement markings are also used to warn motorists of the approach to roadway obstruction not within an intersection. These lines may vary considerably in width. They usually start 6 in. outside of each corner of the obstruction and converge at a point in advance of the obstruction, usually a distance equal to fifteen times the obstruction width. However, it is a general practice not to extend these lines more than 40 ft. in urban and 100 ft. in rural areas.

**Railroad Crossings.** It is very often desirable, especially on rural highways, to give advance warning to the approach of a railroad crossing by means of pavement markings. The purpose of such markings is not only to give warning of the approach, but to provide a proper stop line and to

align traffic in as orderly a fashion as possible. The marking usually consists of the following elements, all in the right lane: a 4-in. yellow barrier line placed to the right of the existing centerline or lane line for about 375 feet; two 12-in. wide white reflectorized 12-in. stop lines across the width of the pavement within 10 ft. of nearest rail; a large painted cross usually 16 ft. high with a 16-in. stroke, in conjunction with two large "R" letters, right and left.

**Parking Areas.** Ends of on-pavement parking lanes and individual stalls are designated by a 4-in. yellow line.

**Curb Markings.** At certain locations where parking is prohibited because of state legal requirements at fire hydrant and curbs adjacent to intersections, etc., curb markings are used to indicate the extent of such prohibitions. Markings consist of a yellow paint covering the entire side and top of the curb throughout the prohibited area.

**Miscellaneous.** Painting of pavement is rapidly spreading to various other phases of traffic engineering, which perhaps would come under the category of object markings. These all point to one very important achieve-



★ Michigan stripes 20-ft. paint, 20-ft. skip, using this simple outfit built around a 1½-ton truck





★ Close-up views of the rubber-tired dolly which carries spray guns, discs, bead dispenser and skip-line control device

ment, that being to reduce the staggering figures of motor vehicle accidents. Paintings usually consist of a dry film that has flexibility to withstand thermal changes or mechanical shock, and abrasive resistance against traffic. The coatings usually consist of opaque pigments and oleresinous varnishes that possess excellent durability and good resistance against weather, showing very little or no premature loss of film integrity such as checking, flaking, or chalking.

#### Reflector Beads Explained

Inasmuch as national records show that more fatal automobile crashes occur in clear weather than in rain, fog, or snow, it is perhaps generally understood that most of the drivers have learned to fear adverse weather conditions and thus drive with more caution. These records also show that one-quarter as much traffic is on our highways at night compared to the daytime, yet nearly 60% of all traffic accidents occur after dark. Bearing this in mind, the Michigan state highway department, in an attempt to provide better illumination, began experimenting in 1939 with beaded reflectorized pavement marking paint.

This product is merely an application of small glass spheres or "beads," a layer of which is deposited and imbedded in a wet pigment binder (paint). The beads reflect the light from a car's headlights and make the paint appear luminous. Glass beaded

*See a forthcoming issue of Roads and Streets for a nation-wide summary of operating problems and striping methods, as reported by additional leading highway departments.*

paint under the rays of headlights has a tendency to provide several times the visibility of even the very best paints without spheres. This reflection is caused by light entering a sphere and being bent at an angle determined by the refractive index of the glass, striking the surface of the sphere which is partially imbedded in the paint or binder, and returning in a path parallel to the incident ray. This is known as "reflex" reflection. The light is then returned to its source, as distinguished from specular or mirror reflection in which the incident light is reflected in the opposite direction at an angle equal to the angle of incidence. In the case of a perfect sphere, specular reflection follows practically the same path as reflex reflection. The reflected ray carries the color of the paint in which it is imbedded, thereby making the line as vivid during the hours of darkness as that of daytime appearance.

**Reflectorization Use Growing.** Since our first experimental experience with beaded pavement marking paint, much has been learned and most of the individuals involved in work of this sort believe we have only just begun to "scratch the surface" in this development.

First, pavement paints should be very carefully selected for maximum day and night visibility. Paints that have a high gloss finish may present a satisfactory daytime appearance but are usually almost invisible at night, due to specular or mirror reflection from the smooth surface. [In specular reflection, light striking the smooth gloss paint surface at an angle, such as that of a motorist driving on a highway, is reflected away from the observer at the same angle instead of being returned. On the other hand, paints with a dull or rough

"What motorists want is one adequate standard system of marking No Passing zones. This desire should be a predominant factor in the decision on this matter . . . not past experience or existing 'pet' designs."—From action statement at the American Automobile Association's recent 44th annual convention.

surface have a tendency to break up the incident light of which a part is returned toward the eye height of the driver, thus increasing the visibility of the painted line.]

#### Bead Application

For proper application, one vendor of beaded reflectorized material recommends that the binder be applied at the rate of 300 to 330 ft. of 4-in. line per gallon of paint, or about 17 gal. per mile. At this ratio the film thickness of wet paint averages 0.015 in.

The glass spheres, which vary in size, are deposited in the wet paint at the rate of 6 lb. per gal. of paint. Beads having a larger diameter than the wet paint thickness are partially uncovered and will provide reflectability, while the smaller beads may be completely covered. As the paint film wears, the larger beads are dislodged and the smaller beads are uncovered and take the place of the larger beads in furnishing reflection. Theoretically the paint film can wear to 0.004 in. in thickness and still retain beads. On the other hand, the beads could be buried and their reflective value destroyed until the binder was worn down to the point where some of the spheres are exposed and permitted to reflect. If the film is too thin when



applied, the beads will soon become dislodged and the reflective life of the line will be greatly shortened.

Michigan has adopted the policy of applying 12 to 14 gal. of paint and 6 lb. of beads per gallon of paint per 4-in. line, as tests have proved this ration ample to provide us with one year's durability on most all of our heavily traveled trunk lines. While the cost of this paint and beads is about 3 times the cost of our standard non-reflectorized pavement paint, if prop-

erly applied, its durability is at least twice to three times that of ordinary paint. Plus the fact that it presents the same night-time appearance and provides reflectability, comparison costs of both beaded reflectorized and ordinary non-reflectorized paints, taking into consideration labor and equipment costs, shows very little difference as presented in final yearly costs.

At night, or when low-visibility atmospheric conditions are present, re-

flective pavement marking lines are worth a slight increase in costs over that of an almost invisible paint.

### Striping Equipment

Michigan's pavement painting evolution is very similar to that of many other states. The earliest method was with a 4-in. template and a paint brush; next, a home fabricated tar kettle mounted on an old truck chassis with metal shoes and a device for depositing tar to the pavement. This

## Safety "Driving Line" Proposed

By E. L. Worthington  
of West Virginia

Continuing with the meritorious ideas for center-striping our highways more effectively [see Nov., 1946, R & S] we reproduce herewith a suggestion passed along by E. L. Worthington, Commissioner, West Virginia State Road Commission. His idea, visualized in the accompanying illustrations, is to place stripes midpoint in each lane instead of at lane edges or center-line. Mr. Worthington, who is one of the profession's most refreshing thinkers, came up through the maintenance department and has that special background advantage for understanding highway needs.

Commissioner Worthington comments on his proposal as follows:

"It is not expected that this proposed Driving Line method will effect a cure-all in regulating traffic. It is merely a suggestion for consideration by those who are interested in developing a workable method.

"The fact that comparatively few of the state highway departments have adopted and even fewer are actually using the AASHO standard method of center line marking is mute evidence that the states are not in accord as to the merits of the method. This fact should tend to convince even the most skeptical that it is not the best method.

"Therefore, it is my opinion that research should be continued until a method is found which will adequately serve the purpose of regulating traffic, and which will also have the approval of all the highway departments because otherwise it will be impossible to have uniform marking to regulate traffic in

all the states, and as a nation-wide uniform method is the greatest need, we should concentrate our efforts to that end.

"This Driving Line method is suggested for all rural road marking. Urban marking must necessarily be governed by individual conditions."

### 19 Advantages Listed

1. Simple to understand—thus making it easy to educate drivers.

2. Definite "Driving Line" right under driver is easy to follow under all driving conditions.

3. Relieves driver of nerve and eye strain in determining location of pavement edge. Particularly helpful at night and under adverse weather conditions.

4. Driver can follow line in heavy fog without sticking head out of window of vehicle, as the line is directly in front of the driver.

5. Provides maximum horizontal clearance between opposing traffic.

6. Eliminates mental hazard resulting from not knowing how close vehicle is to edge of pavement. Modern cars with high wide fronts make it difficult to see edge of pavement close to car.

7. Affords additional protection to pedestrians walking on edge of shoulder at night, because if "Driving Line" is followed, the outer edge of vehicle will never extend beyond edge of pavement.

8. Less danger in applying stripe because application machine is working in traffic lane instead of in center of pavement.

9. Less paint per mile of road is needed because the two broken lines used, except in "No Passing Zones," will require less material than from one to three solid lines, as used in present method.

10. "Driving Line" will last longer because driving on and

across the line is held to an absolute minimum. Under most conditions only two wheels (on the right hand side) ever cross the line.

11. Marring of freshly painted line also held to minimum as the line being only six feet from edge of pavement is easier to avoid.

12. Single driving line in each lane does not create the optical illusion of narrowing the traffic lanes in "No Passing Zones," as in the case of the triple lines in present method.

13. Following the "Driving Line" around curves will eliminate the tendency of the driver in outside lane to crowd opposing traffic in inside lane, thus reducing hazard in negotiating curves.

14. Provides easier passing of vehicle ahead, because if front vehicle is following the "Driving Line" there is little likelihood of its swerving to left, forcing the rear passing vehicle off the pavement.

15. "Driving Line" being right in front of driver provides maximum visibility, because of higher concentration of headlight light. This also results in more nearly maximum reflection from either paint particles, or glass beads when used.

16. Reduces shoulder and pavement edge maintenance, because when "Driving Line" is followed outside wheels will not run off edge of pavement. This also eliminates a traffic hazard.

17. Simpler and easier-to-read type of "No Passing Zone" signs required to inform drivers. Message "DO NOT PASS ON SOLID LINE" is all that is needed.

18. Easier and simpler to designate and obtain observance of "No Passing Zones."

19. As long as a driver can remain right over the "Driving Line" on a curve he knows he is not going too fast to negotiate the curve.

unit was propelled by a mobile unit which in the late '20's pushed it over the highway. After this, a hand machine with a 4-in. felt roller. Then, in 1938 mobile equipment consisting of an air compressor, 60-gal. paint tanks, control panel and miscellaneous attachments mounted on a 1½ ton truck chassis. On the front of this unit is mounted a bicycle wheel to guide the driver and assist in keeping a straight line. On the rear of this truck was mounted a 2-wheel rubber tired dolly carrying spray guns and discs.

### Looking Ahead

Several attempts were made by the Michigan state highway department to develop a suitable dispenser of its own, following a year and a half of tests, changes, and research. In anticipation of the new national standard for a skip centerline, the task was assigned last December to produce a control that would enable the Department to comply with this new standard. Various methods used by other states were investigated but all principles studied, while able to lay a skip line, seemed to present obstacles in the matter of retracing.

Finally last March the newly designed bead dispenser and skip line control device was completed in the form of a 2-wheel rubber tired dolly which carries 3 DeVilbiss Super Spray Guns which can apply either one, two, or three painted lines, independently or simultaneously as the case may require; also 12-in. metal discs which tend to provide clear edges to the painted lines and prevent fogging, and a control box for application of our newly adopted broken line. Recent tests have proved that this device, in addition to being able to provide us with a continuous 20-20-ft. skip line, will give a wide range of variable paint line and skip intervals in the event our standard should at any time change. This can all be accomplished by the operator merely turning two manual adjustments, one controlling the length of the painted line, the other controlling the distance of the skip length. Recent test areas proved that this device was able to retrace previously applied skip line with not more than a 6-in. variation in the distance of one mile, all of which can be readjusted by the equipment operator while the machine is still in motion.

At the rear of the dolly, at about 25 in. to the rear of the spray guns, is mounted our newly developed bead dispenser which is air controlled and synchronized to meet the deposit of paint applied by the spray guns.

## Mail Inserted Card of Inquiry Blank (page 130) for Equipment Data

Again this issue of *Roads and Streets* carries descriptions of many new labor-saving efficiency devices and latest material developments. See our New Equipment and Materials Section beginning on page 110, for which a numbered reply card has been inserted to help you request data on items that interest you. Also on page 130 is an inquiry blank and advertisers' index which will help you get data on equipment and materials you need.

### AED Probes Surplus Property Activities

*Nationwide Investigation Prompts Calling Seminar; Urges Legislation*

Fraud, chaos and inefficiency even greater than heretofore suspected in the disposal of government surplus is indicated as a result of a nation-wide survey carried out by the Associated Equipment Distributors, trade organization of the construction equipment industry, it is said in a news report from AED's Washington headquarters.

F. Gerald Moyer, Washington, Field Representative of the AED Committee on Disposal of Government Surplus, returned a few days ago from a 15,000 mile, two-month observation trip of the surplus situation nationally. His findings at regional groups of small businessmen were so urgent that a two-day meeting of the AED Surplus Property Committee was held in December in the nation's capital.

Ed P. Phillips, Phillips Machinery Company, Richmond, Virginia, was chairman; William A. Danner, Parker Danner Company, Hyde Park, Massachusetts, co-chairman; and Frank G. Knight, AED Executive Office, committee secretary.

Members of the committee, representing small businessmen throughout America, who attended were: H. J. Hush, Griffen Equipment Corporation, New York; M. E. Jost, Equipment Corporation of America, Philadelphia; V. E. Rabel, Star Machinery Company, Seattle; H. O. Stamp, Boehck Equipment Company, Milwaukee; and C. M. Weinberg, Brown-Bevis Equipment Company, Los Angeles; C. F.

Winchester, AED Executive Secretary, sat in on the sessions.

### To Hold National Trade Seminar

The seriousness of the surplus disposal situation to the economic stability of American business prompted AED to sponsor a "surplus seminar" of all national trade associations in January in Washington. At that time, specific evidence of the failure of the Surplus Property Act of 1944 to function as planned was expected to be put into the hands of the officials.

At the AED Annual Meeting, Feb. 13, 14 and 15, at Chicago, a survey of surplus conditions affecting small business throughout the country will be reported to the 1,400 executives of member companies expected to attend.

Also being pushed is the establishment of an investigating committee in both the House and Senate of the 80th Congress immediately to begin carrying on a continuous investigation of all phases of the surplus situation—both domestic and foreign. The duties of the recent House Surplus Investigating Committee (Slaughter Committee) ended with the opening of the new Congress.

The Slaughter Committee was given the cooperation of the AED Surplus Property Committee in its extensive work in exposing unscrupulous dealings in construction machinery. One case involved a \$350,000 purchase of surplus construction machinery in Alaska by a recently established company. Without touching the equipment, the company resold it for \$750,000. Recently the latter purchaser has advertised this equipment for sale in the United States at \$1,500,000.

The latest AED reports on the deal indicate that enough of this equipment has already been resold in Canada to recover the purchase price, leaving enough machinery to be sold in this country to ensure an enormous profit. Many other cases in which speculators have reaped tremendous profits from the sale of surplus equipment and thereby further absorb the markets of established industry, have been ferreted out by the AED committee.

### Committeeman Inspects Hawaiian Surplus

A first-hand view of the surplus situation in Hawaii was brought to the A. E. D. Surplus Committee by Mr. Rabel, member of the committee. He was one of a group of 25 businessmen from the Pacific Coast who were guests of the Secretary of the Navy on a trip to the Hawaiian Islands. He sailed November 10 on the USS Boxer

(Continued on page 102)



## NEW JERSEY MAKES HIGHWAY SAFETY MORE THAN A SLOGAN



New Jersey long ago gave up depending solely on head and tail lights as warning signals on highway department vehicles. This state is one of many to recognize that without special warning lights, snow plows, work trucks, patrol cars, etc., become highway hazards.

To overcome this—to protect its men, the public and its equipment—New Jersey has installed Keystone Flasher Lights on practically all of the highway department's vehicles. This light flashes 80 storm piercing "STOP" warnings per minute—to front and rear. Visible through swirling snow. It acts as a "lighthouse" to promote highway safety.

Used in all snow states on highway plows, and by cities, counties, towns, park and bridge commissions, public utilities, etc., on all types of vehicles. Write on your official stationery requesting sample light for inspection. Auto Gear & Parts Co., 16th St. & Hunting Park Ave., Philadelphia 40, Pa.

Pat. No. 2,280,275  
April 12, 1942



This vibration and weatherproof light is supplied with 6½" red lenses, lettered "STOP"; or with plain red, amber or blue lenses, for 6 or 12 volt systems.

**KEYSTONE FLASHER LIGHT** *"The Lighthouse of the Highway"*

When writing advertisers please mention —> **ROADS AND STREETS, January, 1947**

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# Modern Electrical Equipment

## to Speed Soils Investigation

New York State to aid Subsurface Investigations with Seismograph and Resistivity Apparatus

**M**ORE new modern scientific equipment will be used by New York State in its postwar highway construction program. The work of the Soils Bureau of the State Department of Public Works will be facilitated by acquisition of two units of the most modern scientific apparatus for use in its subsurface investigations of highway and building location, it was announced today, by Superintendent Charles H. Sells. Bid proposals for furnishing a Shepard type portable Seismograph and a Gish-Rooney portable Electrical Resistivity Apparatus, for use by the Soils Bureau, were received recently by the State Division of Standards and Purchase. Estimated cost of the equipment \$5700.

### Augment Core Drilling

The Seismograph and the Resistivity equipment will be used to augment the core drilling and soil sampling methods of physical analysis now in use, serving to extend and to speed up the work of determining sub-surface conditions upon which the design of structures and highways is determined. When used in connection with conventional drilling methods, the new equipment will, generally, speed up the work of exploring foundation conditions that may be encountered by greatly reducing the number of holes that would be required to provide complete information. This is particularly important where large areas or long strips must be explored in connection with institutional layouts or highway construction.

Although the physical analysis of sub-surface samples of soils and rock obtained by core drilling yield more precise methods, the method is relatively slow and, naturally costly. The new apparatus will permit making numerous checks in the area being studied which, when integrated with the information obtained by core drilling, will greatly reduce the number of holes that must be made, resulting in a considerable saving of time and money.

### Seismograph Described

The Seismograph consists of a portable control unit, detonator and three detectors. In use, the detonator and detectors are set up, in line, at measured distances and connected to the control unit. A small explosive charge is set off in the detonator and, at the same instant, a tuning fork is struck in the control unit. An image of the sound waves coming from the tuning fork is projected on a strip of motion picture film to mark a uniform series of time intervals of one-thousandth of a second. The initial sound wave from the explosion travels down through the soil to any hard strata that may underlie it, is carried horizontally over the hard strata and bounces upward to actuate sensitive recording instruments in the detectors. These impulses are carried to the control unit from the detectors, by electrical impulse, where they are recorded upon the moving film strip as a wavy line. The film strip is immediately developed and passed out of the control unit so that the relationship of the three sound tracks can be read against the constant time interval pattern set up by the tuning fork. Readings are recorded and the apparatus may be moved on to another spot for another shot. The readings are interpreted and plotted on a map which reveals the desired information to the geo-physicist and engineer. The seismograph will yield satisfactory results up to depths of nearly 200 ft. and through several intervening strata of different materials. It is particularly useful in locating and charting rock and other hard formations.

### Resistivity Apparatus

The Electrical Resistivity Apparatus will be used principally to chart the locations, type and depth of clays, silts and gravel. It too, will give good results to nearly 200 ft. With this equipment, the known variable electrical conductivity of different soil materials is utilized to chart under-

ground conditions by interpretation of potential changes between electrode rods driven in the surface at fixed distances apart. In use, four rods are driven a short distance into the ground, on a straight line. An electrical current is applied to the outer rods and readings made of the drop in amperes between the outer and inner electrode rods. Readings are made directly from the control unit and recorded. Each test is made with a different distance between electrodes. The equipment is readily portable and readings can be made quickly.

A further use will be made of the equipment being sought by the Bureau of Soils. There are areas in the state in which it is difficult to obtain suitable sand and gravel for concrete highways and structures. With the new apparatus, the Bureau's geologists can prospect for buried deposits of the desired materials from the surface, plot their extent and depth. By these methods, which are relatively rapid and which have proven to be reliable it is expected that sources of satisfactory concrete aggregates will be located that will assure uniformly good concrete throughout the state and result in a tremendous saving in the cost of getting good materials to the hundreds of projects that are being progressed in the Department's \$840,000,000 Postwar Construction Program.

### Travel Habit Studies Underway in 37 Cities

Studies of travel habits are now in progress in the metropolitan areas of 37 large cities in 22 states. They are being made cooperatively by the highway department of the affected state, city authorities, and the Public Roads Administration. In six of the cities additional studies are being made of parking conditions to supplement the information obtained on travel habits. The purpose of the studies is the development of facts needed in planning a solution of traffic problems.

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## The Month's Picture Page

**L**OOK again at this road. It isn't a public road, but a private one—contractor built. It's the \$500,000 haul road over which Macco Corporation and Morrison-Knudsen Company, Inc., are moving nearly 50,000 cubic yards daily on a four-mile haul for the new \$20,000,000 San Francisco International Airport. The haul road itself is quite an enterprise, but the real significance of this picture lies in the big equipment shown. A fleet of 33-yd. self-powered wagons—200-hp., 40-mph., bottom-dump units specially built for this job—is just possibly setting a new pattern of attack for contractors on large airports and even large highway grading jobs in this country. How an 80-wagon fleet, comprising twenty-six of the 33-yarders, is moving over a million yards a month here will be described with other dramatic photographs in an early issue of **ROADS AND STREETS**.





# Coordinate Control Methods



★ Setting stakes on Peter Kiewit & Son Co. contract, Santa Ana Parkway in Los Angeles. Elaborate field control maps paid off here in simpler, surer staking, greater accuracy, ease of restoration of destroyed references

## as Applied to the Design and Construction of City Expressways

**By George M. Leatherwood**

Assistant Engineer, California  
Division of Highways, Los Angeles

**T**HE development of super highways emphasizes the need for a centralized source of engineering survey data. The magnitude and complexity of such highways require specialized branches of highway engineering to synchronize their efforts in order to maintain equilibrium in a constantly changing scheme. Highway design encompasses numerous special branches of engineering and during the earlier stages remains in a fluid state until the various features become fixed. It is evident during this period that a common base for calculations should be available to all. A desirable base is one that will lend itself with equal facility to both office and field use. For this purpose the plane rectangular coordinate system appears to suit conditions best.

The coordinate method has been widely used in most engineering fields, including highway engineering. The purpose here is to illustrate its interdepartmental value and to point out the need for common control for field as well as office use. In order to illustrate the methods used from the beginning of surveys to construction a theoretical example will be used.

Consider that the project runs diagonally across a highly developed section of the city. The routing has been adopted and all that remain are

surveys, design and right-of-way engineering. The importance and magnitude of the project are such that surveys are planned in detail. Base maps of the city are obtained and strip maps covering the routing are made. These strip maps, outlined in color, are furnished to the survey crews for field control. One set of prints shows the outline of the city street system involved, another is outlined showing the outer perimeter for topography control, a third set is colored showing the city street system that is to be cross-sectioned, and a fourth set indicates the proposed construction area. The latter set is used to establish permanent bench marks in the clear of construction and temporary bench marks within the area for convenience of the cross-section crews.

### Beginning in Field

The first crews in the field are

assigned portions of the street system to traverse. They generally develop the center lines from data furnished by the local engineering agency responsible, i.e., city engineer or county surveyor. The traverse crews work to an accuracy of 1:20,000. Their efforts are directed toward measuring distances and angles encompassing the system. They paint the stationing on the center line of street as the work progresses, for use of the topography and cross-section crews. The largest perimeter within the system of the portion assigned is traversed, then the individual streets within this perimeter. This information is forwarded to the office where it is analyzed, adjusted and coordinated. The bench level, topography and cross-section crews follow, forwarding their data to the office as the work progresses. They color the base maps of their section, showing the portions completed in order that additional crews

*The following article, written specially for Roads and Streets, explains the adaptation and use of the coordinate method of ground control to the survey, design and construction of Metropolitan Freeways by District VII of the California Division of Highways.*

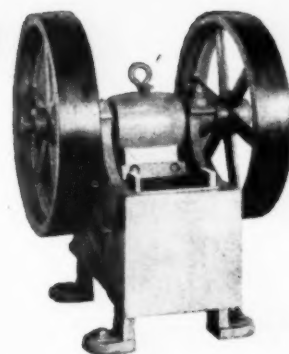
*In projects of the complexity and magnitude of the metropolitan freeway systems now being planned and designed in many cities of the United States, it may well be that other state highway departments or planning agencies have utilized this ancient and flexible system in their freeway or parkway planning. If they have not, the advantages outlined in the following article appear to indicate that the flexibility, accuracy and economy of the methods outlined are worthy of widespread use. The nature of the procedure has been amply demonstrated by the division of highways of the State of California in developing the designs for a number of complex projects in the Los Angeles area.*



## Look to the Leader—UNIVERSAL

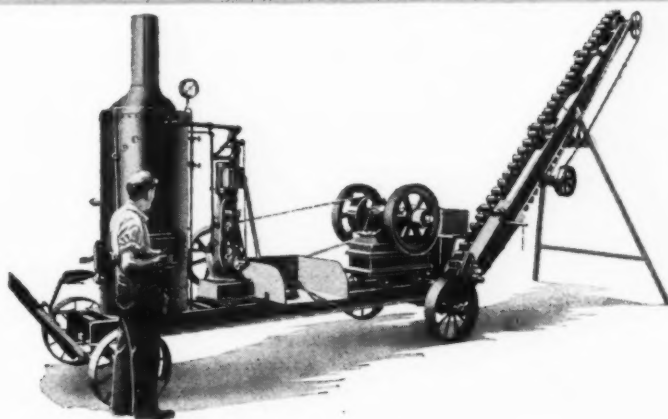
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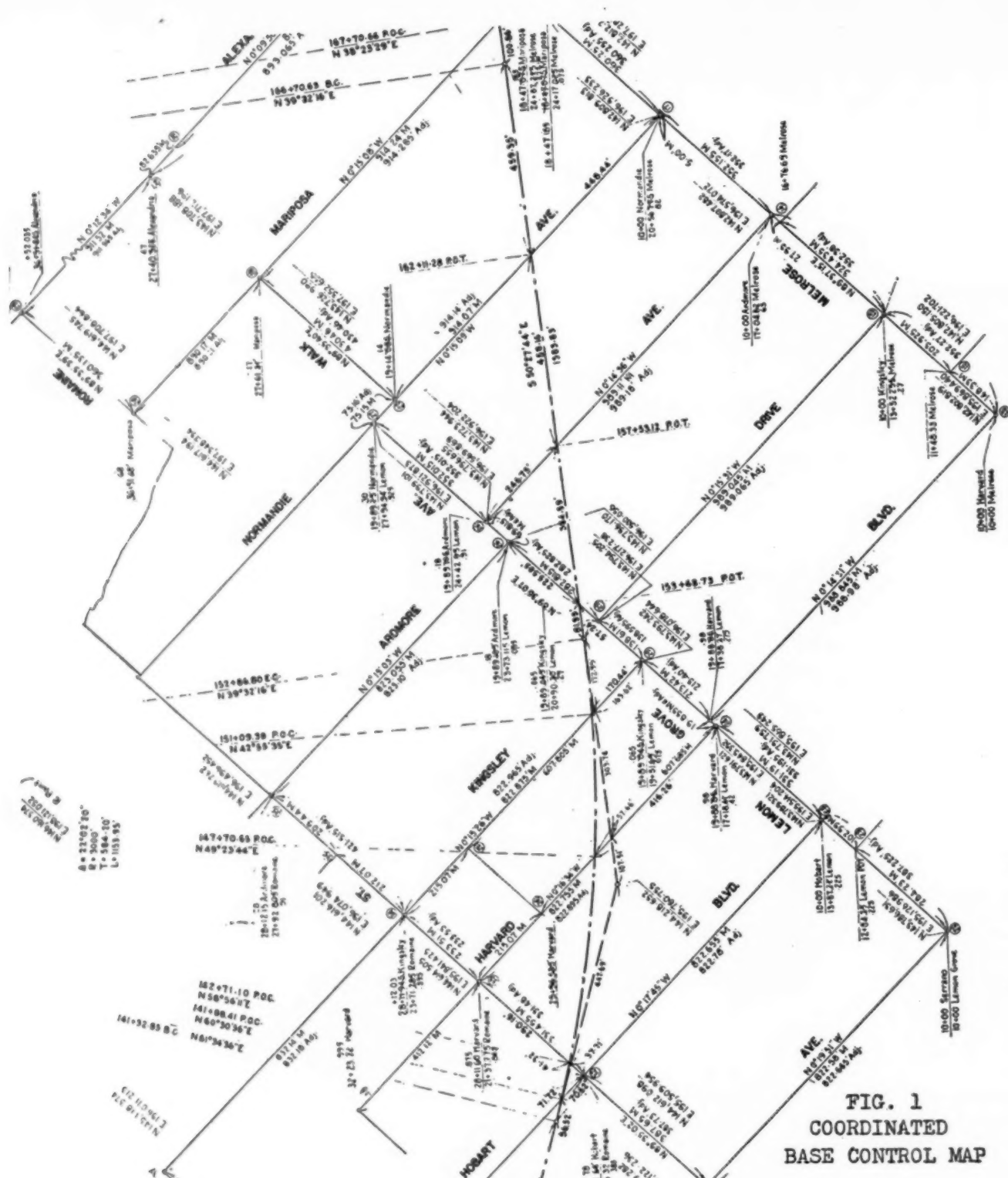


FIG. 1  
COORDINATED  
BASE CONTROL MAP

★ Coordinated Base Control Map of a highly developed portion of Los Angeles, with a uniform rectangular street system. The single diagonal line is the proposed parkway alignment, showing ties to the street system. The purpose of this map is to act as a common base of calculations for inter-departmental use as well as for outside engineering agencies. (Applies to Fig. 2 as well)

may work in the same area without duplication of effort.

**Skeleton Maps**

In the interim, office engineers are preparing skeleton maps. These maps are single line drawings on tracing cloth. They show the proposed route,

center lines of the street system, measured distances, adjusted distances, bearings and coordinates to all intersection and angle points. These coordinated skeleton maps are distributed to other agencies that have an interest in the project. These agencies normally consist of the de-

partments within the organization and also outside agencies such as city, county and public utility engineering departments. The various agencies mentioned used the coordinated map values to tie in and compute whatever work they are doing, the final result being a set of plans and maps

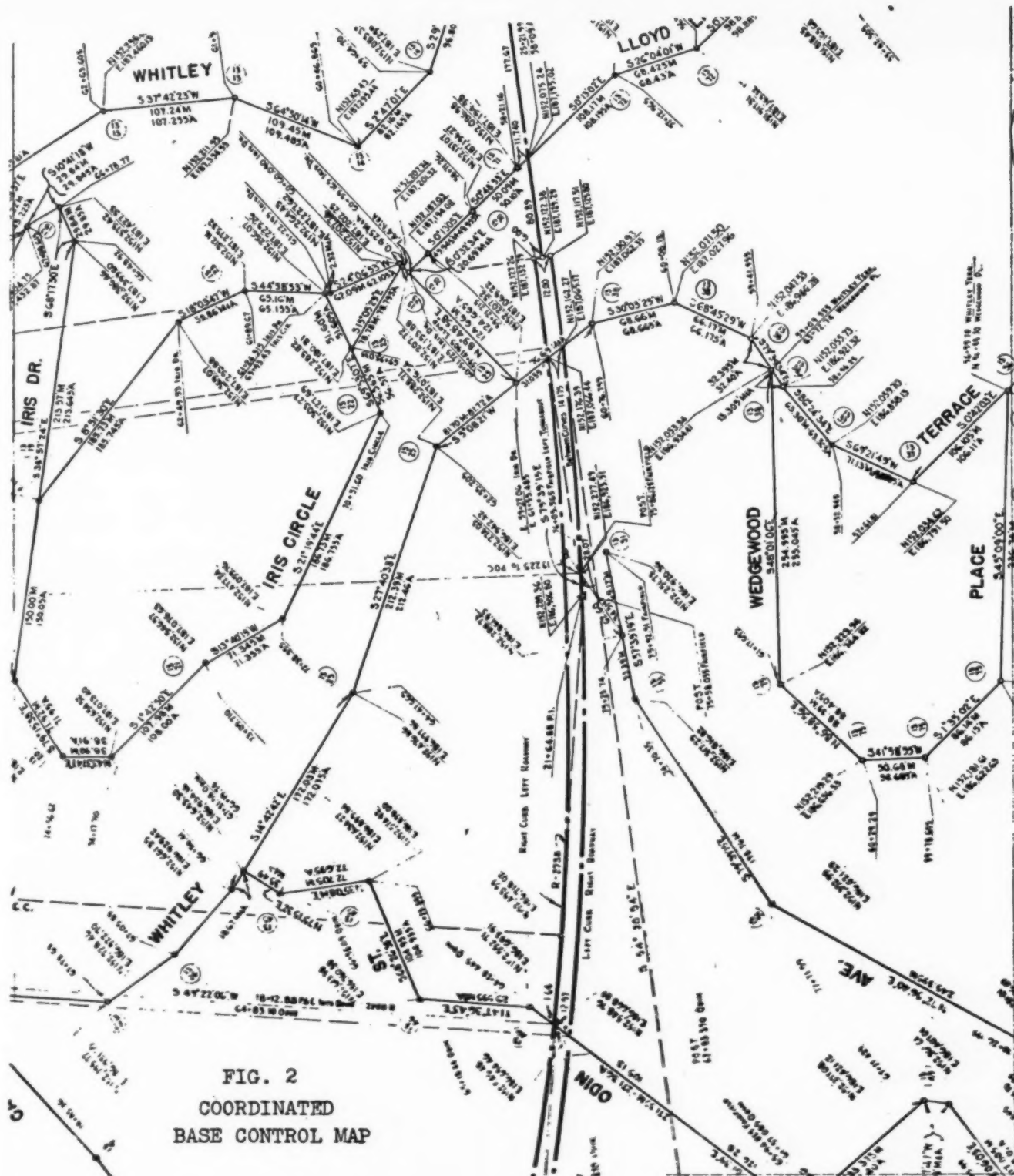


FIG. 2  
COORDINATED  
BASE CONTROL MAP

★ Also a Coordinated Base Control Map of a highly developed portion of Los Angeles. The terrain is steep, rolling hills, artistically developed with beautiful homes and winding drives. The proposed parkway development is partly shown as a double line, representing right and left roadways converging and therefore not concentric

containing coordinate values to important control points.

The practical use of these coordinated plans and maps is endless; but, for the purpose of illustration, consider the afore-mentioned project has been let to contract. The various plans are complicated by underground

structures of all types with attendant surface connections, under and overpasses, on and off ramps, deceleration and acceleration lanes, retaining walls, etc. Add to this the right-of-way which consists of a series of irregular jogs, curves, bays, etc., that are necessary due to design, damage

and ownership problems. Under the conditions explained, the skeleton base map along with the coordinated plans permits the construction survey crew to retain survey control. It is no longer necessary to tie out points in order that the center line may be replaced. In most cases chained or



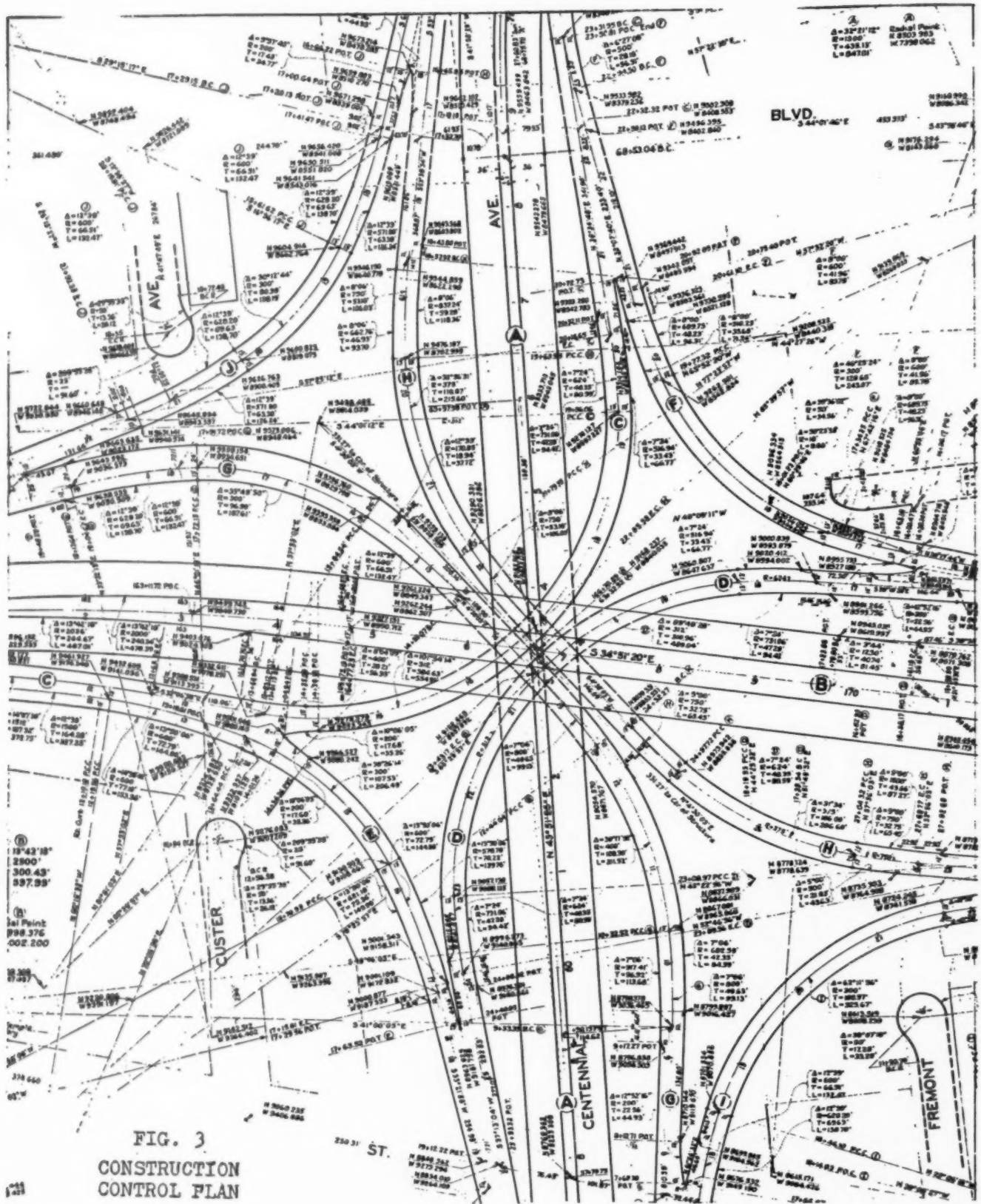
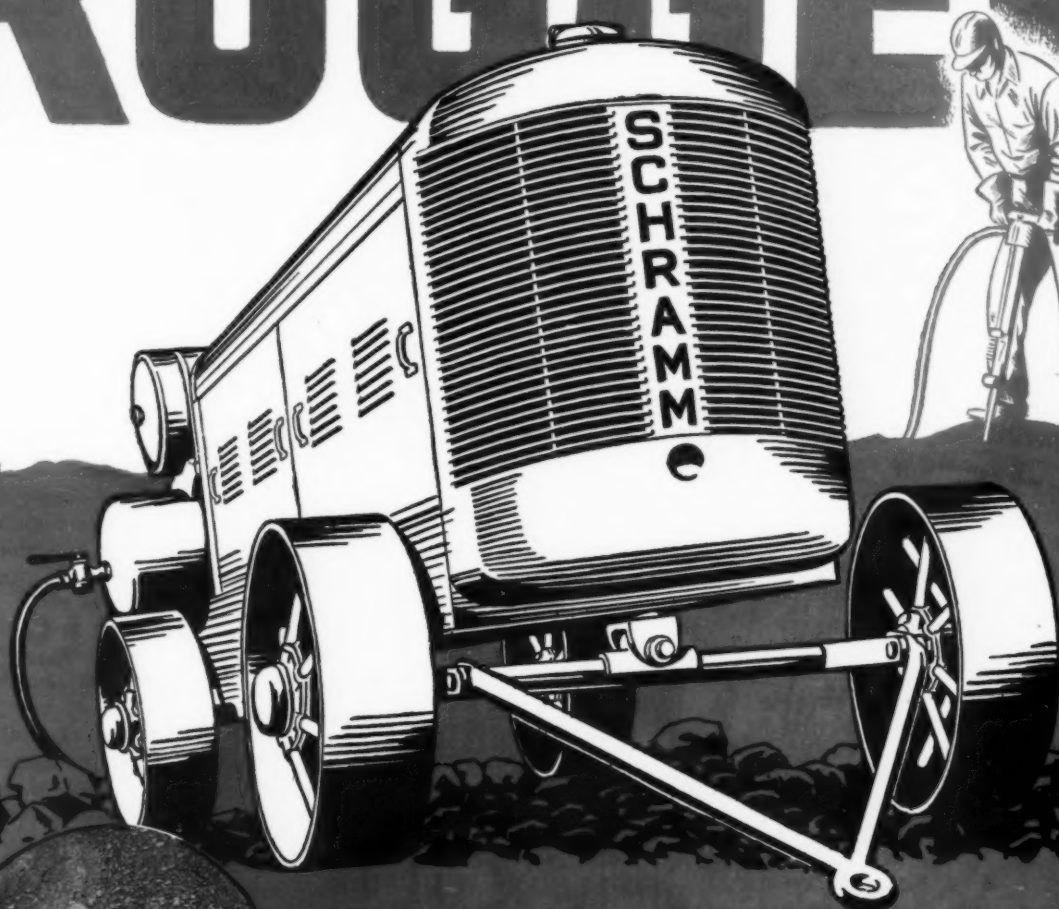


FIG. 3  
CONSTRUCTION  
CONTROL PLAN

★ Portion of a Construction Control Plan of two intersecting parkways at Los Angeles, involving the widely publicized 4-level interchange. The magnitude and complexity of an intersection of this type requires positive construction control. Close observation of this figure will show that all-important control points are co-ordinated and alignment and curve data provided sufficient to

replace any portion. Map prepared by the roadway design department and acts as a guide throughout construction for underground storm drains, sewers and public utilities, as well as control of the intersecting bridge structures. These individual items are contained in plans prepared by the different organizations involved and their positions controlled by the coordinate control system

# RUGGED



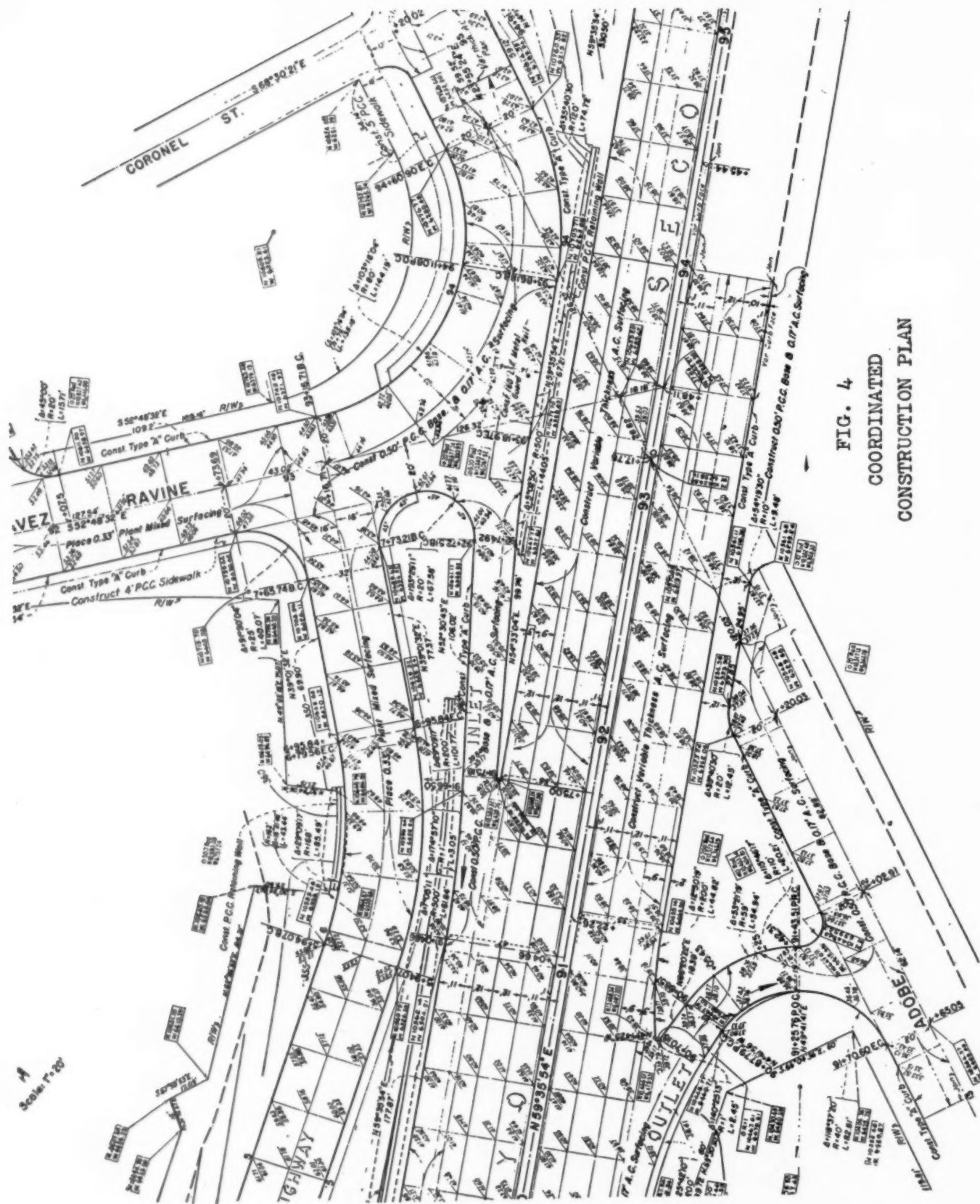
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★ A Coordinated Construction Plan. This plan differs from Fig. 3 in that all control valves are shown and there is no need for a construction control plan. Note that the right-of-way line consists of an irregular line that would ordinarily be difficult to establish, particularly on the outer roadway between Sta. 91 and 92 where pro-

vision had to be made to save an oil well. The right-of-way line offsets around this well and damage is prevented by the construction of a reinforced concrete wall. All construction control points have been coordinated and are shown enclosed in rectangular blocks

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intersecting ties cannot be used effectively, due to the wide widths of the construction areas and the contractor's activities.

The coordinate method of staking any particular item on the contract is to take off from any known undisturbed coordinate point, establish a temporary point in the vicinity of the item or items to be staked, and then tie into a second known undisturbed coordinate point. If these points have not been disturbed, the error of closure will fall well within 1:10,000 which satisfies the construction accuracy. The temporary point is occupied and the necessary points for construction control are set. How simple this procedure is, when compared to re-establishing of center line, base line or layout lines under difficult construction conditions.

#### Value of Coordinate Control

Coordinate control is a valuable asset. If not mishandled it permits small increments of a contract to be staked with the knowledge that all the parts will fit together as it nears completion. Points may be set to whatever accuracy that is needed. An endless variety of combinations, using coordinates, may be used depending upon conditions at the time of need.

Right-of-way presents another perplexing problem. The irregularity of these lines due to small individual parcels of land involved, as well as certain construction features, will not permit much latitude by traverse or plus and offset methods. The coordinate method is once more the answer to this problem. Points are set on the property corners of right-of-way line to the degree of accuracy necessary, depending upon their permanency and their use. The important feature is that small sections of right-of-way may be staked with accuracy, confidence and speed.

#### Angle Correction

A question which may have occurred to the reader is: "If a theoretical straight line has been projected on a diagonal through a number of city blocks, would there not be a slight angle at each intersecting street?" The answer is, "Yes". When the right of way has been cleared of all obstructions a transit line would show that the intersection points set by ties from the nearest intersection would not necessarily check by a small amount, depending upon the distance between them. It then becomes obvious upon further examination that these slight angles do not materially change the design of construction nor do they disturb the description of the right of way lines. From this line of reasoning it is evident that the proj-

ect has been divided into individual sections between intersecting streets and the whole tied together by coordinate control. It is further reasoned that the right-of-way lies between individual parcels of land on either side; therefore if the individual parcels bounding the right of way are defined, then the right of way consists of the remainder. Should the problem be considered from the usual method, that is, the right of way established from ties to the base, layout or center line, there would be a greater chance of encroachment onto private property, with the added danger of damage.

#### Determining Boundaries

Another question might be: "How are the boundary lines of the individuals' parcels determined?" In most cases it is rather simple inasmuch as most of the land in the west has been divided up by subdivisions, and therefore the individual parcels are prorateable within the blocks, with certain rare exceptions. These exceptions occur when lines of possession defined on the ground do not agree with the recorded subdivision. Should it prove upon analysis that lines of possession will hold, then the error is considered to have been made in the original survey. Upon completion of the analysis, coordinates are computed and shown on the right-of-way maps. At some later date should the position of these points which define the right of way line be challenged, it would be a rather simple matter to check. If an error exists, adjustments would be made to the satisfaction of the injured party or parties. This plan has been given careful consideration and weighed against other methods. It was found that the savings in survey and office work by the plan outlined justify the slight cost and inconvenience that may occur when errors are found.

The coordinate method of base control described in this paper has been in actual use both in the office and on construction and has definitely proven its value.

#### AED and AGC Establish New Joint Coop Committee

The establishment of a Joint Cooperative Committee between the Associated General Contractors of America and the Associated Equipment Distributors is announced by H. E. Foreman, Managing Director of the A. G. C., and C. F. Winchester, Executive Secretary of the A. E. D. Members of the committee are:

Representing A.G.C.

D. W. Winkelman, D. W. Winkelman Co., Syracuse, N.Y.

R. E. O'Connor, J. C. O'Connor & Sons, Inc., Ft. Wayne, Ind.  
J. D. Bonness, Joseph D. Bonness, Inc., Milwaukee, Wis.

E. G. Hoeppner, Hoeppner-Bartlett Co., Eau Claire, Wisc.

John MacLeod, Macco Construction Co., Clearwater, Calif.

F. B. Winston, Winston Bros. Co., Minneapolis, Minn.

Representing A.E.D.

A. F. Garlinghouse, Garlinghouse Bros., Los Angeles, Calif.

G. W. Swart, Contractors Machinery Co., Grand Rapids, Mich.

P. A. Dufford, Intermountain Equipment Co., Boise, Ida.

J. N. Harvey, Louisiana Tractor & Machinery Co., Baton Rouge, La.

E. J. Crosby, Hedge & Mattheis Co., Boston, Mass.

R. E. Corson, Ray Corson Machinery Co., Denver, Col.

In making the announcement, Mr. Foreman and Mr. Winchester stated: "Establishment of the Joint Cooperative Committee between the two nation-wide organizations provides a continuing means through which contractors and equipment distributors can secure a better understanding of their mutual problems, and through which practical suggestions can be developed for working toward improved conditions in the construction industry.

"Establishment of the national committee also provides a framework for cooperative action which can be carried out by A. G. C. chapters and branches and A. E. D. regional organizations in their respective communities.

"Among the subjects which have been suggested for discussion are problems of surplus equipment, equipment sales contracts, servicing new equipment, repair parts orders, day labor, equipment standardization."

#### 27,000 Miles of Road Needs Repairs

A large part of the highway construction of the immediate future must necessarily be the replacement of badly worn road surfaces and reconstruction of obsolete sections of road. This class of work practically ceased during the war and the lost ground must be regained. According to the Public Roads Administration, a recent inspection of that portion of the Federal-aid system completed with Federal aid shows that 27,000 miles, or 14%, is in urgent need of resurfacing or relocation to remove hazardous conditions.



## 2-Way Radio Phone in Traffic Signal Repair Work

**By LeRoy C. Smith**

County Highway Engineer,  
Wayne County, Detroit, Michigan

**T**HE last of September, 1946, the Board of Wayne County Road Commissioners in Michigan, installed a two-way radio-telephone in its signal maintenance truck 9-442. Radio telephones in moving vehicles are not new, but this appears to be the first set in use for this particular purpose. The aim is to reduce the period between the receipt of an "out of service" report for a traffic signal and the resumption of normal operation of the signal. This naturally cuts the danger time of unregulated traffic.

Wayne County is a thickly populated area, called during the war the "arsenal of democracy." The extreme density of its traffic patterns makes it highly important that its traffic signals be operating as near 100% of each 24 hours as is humanly possible. So any device for shortening "out" periods contributes to the over all safety of our highways.

The Michigan Bell Telephone Company cooperated in installing the set in the truck. Calls concerning signals



out of order usually come to our Wyoming Yard switchboard and are relayed from there to the truck

wherever it may be in the county. It is possible, however, to call the truck directly from any telephone. For in-

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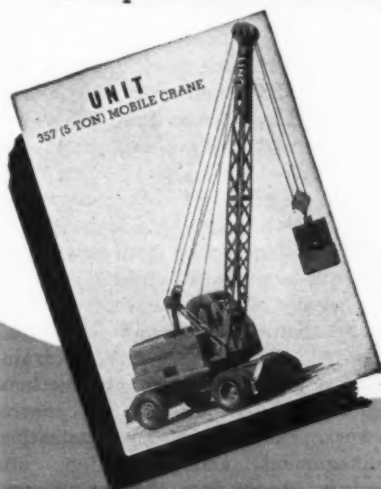
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★ Electrician Alfred D. Berger and Robert Rodda were in the truck out on the road. Berger received Seibert's call over his receiver, which is mounted on the dash of his truck

stance, one of our staff, anywhere in the county, can step to the nearest telephone and call for or dial "long distance" and ask to be connected with the "mobile operator". The code number of our truck is given to this operator and in response to her signal a light shows and a bell rings in the set mounted on the truck's dash. The procedure then is the same as with any ordinary phone conversation.

Aside from time saved, the signal men themselves comment on the convenience of the installation over previous reporting methods. This same system may be extended to include other trucks and vehicles of the road organization.

The pictures show what happens when such a signal failure is reported to the Road Commission. They were taken October 3, 1946.

•  
**Federal-Aid Bidders Decrease**—The average number of bidders on Federal-aid highway jobs decreased from 5.7 in January, 1946, to 3.8 in September.

### Town Hall Meeting on Airports

The Airports Session of our 44th Annual Convention, scheduled to be held at the Palmer House, Chicago, Illinois, Feb. 17-20, 1947, will consist of a "Town Hall Meeting on Airports", with special emphasis being given to the coming Federal-aid airport program. The meeting will con-

sist of discussions by experts to make clear the regulations involved in carrying out the program. In addition, other subjects pertaining to airfields will be treated by other experts in a comprehensive manner.

"Town Hall Meeting on Airports" is to be conducted under the leadership of a Moderator who is an outstanding person in aviation, and supported by 18 or 20 panel members, each an expert in those phases of airport development which will be assigned to them. Pertinent questions concerning various phases of airport development are to be posed by the Moderator to the panel members, who will interpret the questions and solve the problems posed, doing so in the form of proper and correct answers.

There will be some 60 formal questions, divided equally among panel members. Thus, each member will have propounded to him three questions, pertaining to one or more of the following phases in airport development:

(1) Scope and Purpose of the Federal-aid Airport Program.

(2) Programming and Scheduling Federal-aid for Airports.

(3) Design and Construction of Concrete Aprons, Runways and Taxiways for Light, Medium and Heavy Loads.

(4) Design and Construction of Flexible Pavements (Asphalt, Tar and Turf) for Aprons, Runways and Taxiways for Light, Medium and Heavy Loads.

(5) Significance of Subgrade-Support for Airport Pavements.

(6) Value of Super-Compaction of Subgrades and Base Courses.

(7) Methods for Making Airports Self-Sustaining.

(8) The Need for and Advantage of Freeway-type of Access Roads Between Airports and Heart of Cities.

(9) Geometrical Layout of Airports, and Need for Master Plans.

(10) Financing Sponsors' Share of Airport Costs.

(11) Relationship of Subgrade-Support to Thickness of Flexible Pavements for Airports.

(12) Current and Prospective Airport Legislation—National and State.

(13) Advantage of Funneling Through State Aviation Agencies Requests for Federal-aid for Airport Development.

(14) Airport Drainage Problems.

(15) Are Property Owner-objections to Close-in Airports Justified?

(16) Granting Privileges for the Sale of Aviation Gasoline and Oil at Airports.

(17) Airport Terminal Buildings and Hangars.

(18) State-aid for Local Airport Development.

(19) Airport Snow Removal.

(20) Advantage of a Monthly Schedule of Airport Maintenance.

(21) Use of Vertical Sand Drains to Speed Settlement of Muck-Filled Airport Sites.

In addition to the formal questions, a period of about 20 minutes will be available in which the audience will be asked to submit questions. The formal questions will be submitted to panel members before the meeting, thus affording an opportunity for them to formulate concise answers. Therefore, the answers will be well-considered and will be authoritative, and extremely helpful to sponsors of airport development projects. Nevertheless, the whole atmosphere of the "Town Hall Meetings on Airports" is to be informal, and the experts' answers will be given in an impromptu manner. The answers, of course, will be those of the individual panel members, given in accordance with the facts and good practice. Nevertheless, panel members will be free to tinge their answers with their individual philosophy with respect to the subjects they cover.

### "Airports: Design, Construction and Management"

A new text and hand book entitled "Airports: Design, Construction and Management", has been published by McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York, N. Y.; \$7.00. Authors are Horace Glidden, formerly assist. superintendent of airways, 1st Region, Civil Aeronautics Administration, who was more recently Eastern Editor of *ROADS AND STREETS*, and is now a contributing editor having returned to CAA as district airport engineer, Boise, Ida.; Hervey F. Law, manager, Washington National Airport; and John E. Cowles, chief, airport design unit, First Region, CAA.

The 650 pages of this book, which constitutes a major reference, are almost equally divided between formal text and a series of appendices. The text covers sixteen chapters: preliminary requirements, site selection, survey, soils, grading design, drainage, pavements, turf, obstructions, lighting, buildings, traffic control towers, radio aids, communication, management and operation, and zoning. Appendices numbering some thirty-one contain a vast amount of data on phases of chapter subjects, and include reprints of important CAA manual data, Highway Research Board committee reports, etc.

# 1946 Highway Legislation in Review

**M**UCH new legislation affecting highway users was enacted in the nine regular and two "carry-over" state legislative sessions meeting in 1946.

*Kentucky, Louisiana, Massachusetts, Mississippi, New Jersey, New York, Rhode Island, South Carolina and Virginia* enacted a total of 66 bills of primary interest and importance, while *Georgia* and *Missouri*, carry-overs from the 1945 sessions, enacted ten such measures.

## Anti-Diversion Constitutional Amendments

A constitutional amendment was adopted in *Massachusetts*, which if jointly agreed to by the next legislature and approved by popular vote, will prevent diversion of highway user revenues. Similar measures failed in *Mississippi, New Jersey, New York*, and *Rhode Island*. The *Virginia* legislature by joint resolution expressed its intent that motor fuel and motor vehicle revenues be used solely for highway purposes.

## Motor Fuel Taxes

*New York* legislation extended the 2 cts. emergency gasoline taxes. *Virginia* increased gasoline tax from 5 to 6 cts. per gallon, effective June 19, 1946. The tax was made applicable to all gasoline purchased by carriers outside the state, but used over roads in the state by laws passed in *Virginia* and *Mississippi*. Proposed gas tax increases were defeated in *Kentucky, Massachusetts, Mississippi, Rhode Island* and *South Carolina*. A bill to permit a 1 ct. municipal processing tax on gasoline died in *Mississippi*.

In *Mississippi* the legislature revised and re-wrote the gasoline tax law, but the rate remained unchanged. The tax rate on motor fuel other than gasoline, however, was raised from 6 to 7 cts. per gallon.

Gasoline tax refund amendments were enacted in *Georgia, Kentucky, Mississippi* and *South Carolina*. The *Kentucky* and *Georgia* enactments concerned agricultural uses of motor fuel.

Data supplied by the National Highway Users Conference, Washington, D. C.

## Size and Weight

Size and weight increases became law in four states: *Kentucky, Massachusetts, Mississippi* and *New York*.

In *Kentucky* single unit length was increased from 26½ ft. to 35 ft., tractor-semi-trailer length from 40 ft. to 45 ft., and gross weight from 28,000 lb. to 42,000 lb. *Massachusetts* increased maximum length of tractor-semi-trailers from 40 to 45 ft., and gross weight of two-axle vehicles from 30,000 lb. to 36,000 lb. and three-axle vehicles from 40,000 lb. to 50,000 lb. *Mississippi* provided for axle weights based on tire sizes. Gross weight is determined by axle spacing and the maximum increased from 30,000 lb. to 45,000 lb. The 35-ft. maximum length limit for single units in *New York* was made inapplicable to semi-trailers.

Thirteen bills liberalizing vehicle sizes and weights failed of enactment in the eleven states under consideration.

## Equipment

The use of red emergency reflectors by disabled vehicles on the highways is permitted by an amendment to *Massachusetts* motor vehicle equipment law. A *Mississippi* enactment requires the placing of red flags 100 ft. to the rear and 100 ft. forward of a disabled vehicle during the day. *South Carolina* suspended motor vehicle inspection until March 1, 1947.

## Reciprocity

New legislation in *Mississippi* permits establishment of ports of entry, which are called "courtesy stations." The Motor Vehicle Comptroller, subject to the Governor's approval, is authorized to establish these stations for the purpose of enforcement and administration of the laws relating to the levy and collection of gasoline, oil, and other petroleum product taxes, and grades, standards, and specifications thereof, motor vehicle privilege taxes, and other laws subject to administration by the Comptroller.

In *Kentucky* four bills, which would have exempted non-resident motor vehicles from the state motor vehicle use tax, granted full reciprocity to non-resident passenger cars, and authorized the making of reciprocal agreements, failed of enactment.

*Virginia* exempted non-resident for-hire carriers from its 2% gross receipts tax.

## Registration

Bills relating to motor vehicle registration were introduced in all eleven states. Out of the approximately forty-two introductions, seven bills of importance were enacted.

*Georgia* changed the weight fees on truck-trailers and semi-trailers not operated for hire from \$1,000 for all excess over 10,000 lb. to \$300 for 10,000 lb. to 12,000 lb., \$500 for 12,000 lb. to 14,000 lb., and \$1,000 for more than 14,000 lb. The weight fees for such vehicles when operated for hire are changed from \$15,000 for more than 10,000 lb. to \$600 for 10,000 lb. to 12,000 lb., \$1,000 for 12,000 lb. to 14,000 lb., and \$1,500 for more than 14,000 lb.

*Kentucky* changed the schedule of registration fees from a capacity basis to a gross weight basis with the fees graduated from \$10 for 5,000 lb. or less to \$150 for the maximum weight of 42,000 lb. An additional weight tax was imposed on all trucks other than carriers of property, wherein the gross weight exceeds 18,000 lb. This additional tax is graduated from \$67 to \$200 for weights ranging from 18,000 lb. to 42,000 lb. An additional weight tax on trucks operated as carriers of property is imposed ranging from \$22 for 5,000 lb. or less gross weight to \$300 for the maximum 42,000 lb. A 50% additional fee is applicable when the vehicle is not equipped with pneumatic tires.

*Mississippi* revised its registration and privilege license fees, decreasing

## Mail Inserted Card of Inquiry Blank (page 130) for Equipment Data

Again this issue of *Roads and Streets* carries descriptions of many new labor-saving efficiency devices and latest material developments. See our New Equipment and Materials Section beginning on page 110, for which a numbered reply card has been inserted to help you request data on items that interest you. Also on page 130 is an inquiry blank and advertisers' index which will help you get data on equipment and materials you need.



nearly all fees and changing the basis of tax on common and contract passenger carriers from seating capacity to gross revenue. Mileage taxes formerly graduated upon carrying capacity were imposed at a mileage rate dependent upon vehicle classification. The gross revenue tax upon common and contract passenger carriers is to be paid quarterly rather than annually. Other *Mississippi* legislation provided for the registration on a gross weight basis of vehicles using fuel other than gasoline.

*Missouri* enactments revised the law relative to motor vehicle fees and regulations.

*New Jersey* increased registration fees for commercial vehicles, trailers, semi-trailers, and tractors having a gross weight exceeding 10,001 lb.

Cities over 70,000 population in *South Carolina* may continue to require registration of resident motor vehicles.

The *Virginia* legislature reduced the minimum registration fee for automobiles from \$8 to \$6 and in-

creased the fees for common and contract property carriers. These fees range from 18 cts. per cwt. for gross weights of 10,000 lb. or less to 90 cts. per cwt. for gross weights between 45,001 lb. to 50,000 lb. on contract carriers, and from 30 cts. per cwt. to \$1.50 per cwt. for the same weights for common carriers.

#### Carrier Taxation

Five states enacted tax laws of importance to carriers. *Kentucky* included non-resident contract, as well as common, carriers in the exemption from the weight tax where the distance traveled in the state does not exceed 15 miles from the point of entry. *New Jersey* provided that the gross receipts tax on buses operating in municipalities shall not apply to charter or special bus operations. In *Virginia* certain counties were authorized to tax and regulate taxicabs.

#### Carrier Regulation

*Kentucky* legislation amended the regulations governing the abandon-

ment of carrier rights under certificate. *Louisiana* revised its carrier regulatory law to re-define various carriers and re-state the exemptions.

*Massachusetts* has provided for the issuance of carrier plates to be used only on vehicles temporarily leased by such carriers.

*Missouri* exempted from carrier regulation motor vehicles transporting farm machinery, produce, supplies, household goods, and other articles or commodities from farm to farm, and motor vehicles exclusively engaged in interstate operations between a municipality and its suburban territory in *Missouri*, where the population is not in excess of 600,000, and an adjoining state.

*Rhode Island* re-enacted its Property Carrier Regulatory Act to conform to the Federal.

#### Financial Responsibility

The *Kentucky* legislature enacted the Uniform Motor Vehicle Safety Responsibility Act requiring security in the amounts of \$5/10/1000 subsequent to an accident and unsatisfied judgment. In *New York* it was provided that, in the Commissioner's discretion, persons required to furnish proof of financial responsibility might be relieved of such requirement when 3 years have elapsed with no convictions or forfeitures under the Act.

#### Highways

*Kentucky* legislation provides for the construction of limited access highway facilities. *Massachusetts* has authorized the construction of underground parking facilities beneath the Boston Common financed by private capital.

#### \$650,000,000 of Highway Contracts Let

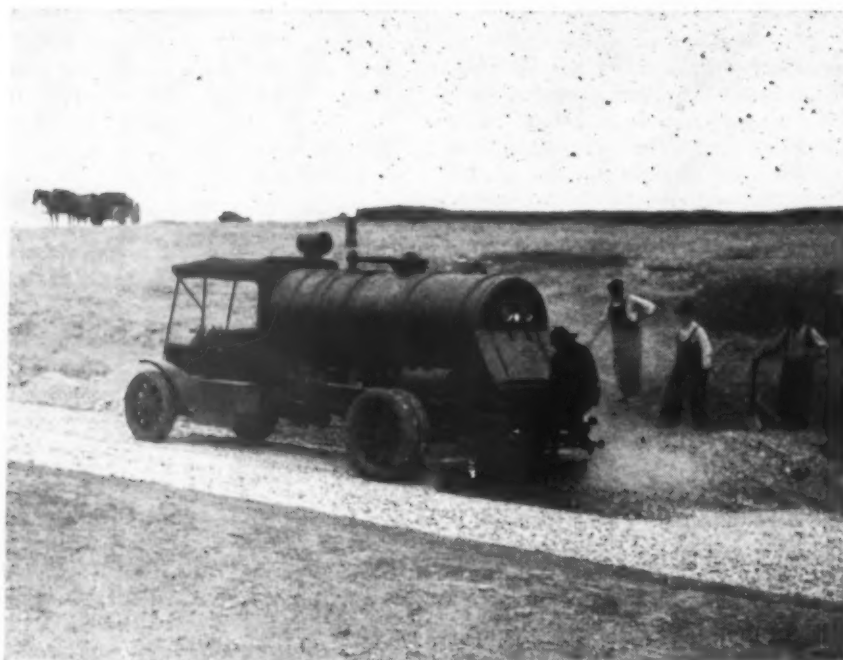
Federal-aid highway contracts awarded from January through October totaled \$450,154,000 for 16,125 miles of road. Federal participation amounted to \$243,224,000. Total contracts awarded by state highway departments, including Federal-aid, amounted to \$650,419,000 for 39,864 miles of road. The average length of project was 4.6 miles.

#### Employment in Highway Construction

From January through September, 1946, employment on highway construction involving Federal funds and other state construction was 432,800 man-months or 44% over that of 1941. State highway maintenance work was progressing much more satisfactorily with 947,700 man-months or 88% of the 1941 figure.

## In Days of Old

Roads and Roadbuilding in Years Gone by



#### First Bituminous Distributor in U. S. with Oil Burning Heater

From William E. Worcester, vice president of Kinney Manufacturing Co., Boston, comes this historic photo, taken on a glass photo plate back in 1913. It shows the first bituminous distributor with heaters made by the Kinney organization. This machine was sold to the City of Worcester, Mass., and began work in the spring of 1914, serving that city for many years on tar and asphalt penetration street construction and for surface treatment. It is said to be the first American-made unit to have an oil burning heating system.

Worcester's early adoption of machine application in place of hand pouring was in itself a piece of pioneering, and the idea was soon taken up by other cities and highway departments. The truck was a Peerless, a now extinct make of car and truck well known in those days.



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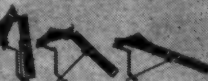
Low Center  
of Gravity



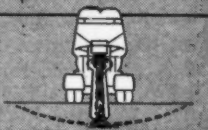
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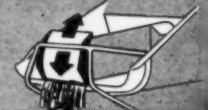
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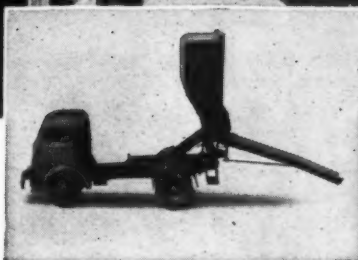
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# Corrugated Plate Pipe Culvert

## Carries 61 ft. of Fill

**W**HILE in no sense a record, the fill height of 61.5 ft. over the top of a 120-in. corrugated plate pipe culvert recently completed on U.S. 40, in Colorado, is still a lot of dirt and rock. This culvert, which is 240 ft. long, is part of a 2.47-mile Colorado state project completed during 1946 after cancellation at the beginning of the war. The pipe was assembled and bolted late in 1941, but no fill cover placed until recently.

The project, under Federal Aid, consists of a relocation to eliminate a dangerous mountainside alignment high up in the Rockies above Berthoud Pass (el. about 10,000 ft.), near the western portal of the famous Moffatt railroad tunnel. C. A. Switzer was the contractor on the 1941 cancelled work. The completion contract was performed by Brown Construction Company of Denver.

The pipe structure is all of one gauge of galvanized corrugated iron segments (Armco) having special punching and with corrugations  $\frac{1}{2}$  in. deeper than standard. The pipe was trucked to the site in segments and erected with a small crane. Because of the heavy fill, longitudinal seams required six 11/16-in. bolts per foot of pipe length and the seams also were staggered in accordance with a special specification.

The pipe was bedded on select material by the original contractor. In carrying fill up around the pipe special attention was given to obtain uniform and adequate consolidation immediately adjacent to the pipe walls. Before carrying fill on upward the new contractor constructed concrete headwalls. The accompanying photo shows his use of a small earth dam and length of 24-in. corrugated pipe to bypass the inlet with the small flow of water existing at the time. Workers are seen trenching for the headwall footing. Similar procedure was taken at the down-stream end, a small pump (see just inside big pipe) being adequate for de-watering the footing trench. The big fill was built up with good granular materials and rolled by usual procedure.

★ Erecting the big pipe. Note existing highway location on shelf in background. Specially punched segments with extra-deep corrugations were specified



★ How low-water flow of the stream was dammed to expedite headwall footing construction



PETER KIEWIT SONS' COMPANY, OMAHA, reports, "A splendid job!" being done by Mack trucks handling a concrete paving contract on the Pacific Highway, State of Washington.



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***and MACKS maintain them...***



The City of Cleveland has this Mack road oil distributor at work on its post-war street improvement program.



(Continued from page 70)

Since at least one leading equipment maker is believed to be grooming a unit for vibratory rolling, much practical interest is attached to the work reported by Prof. G. P. Tschebotarioff of Princeton University and George W. McAlpin of CAA. Both presented data on research begun in 1944. From a study of redistribution of shearing stresses during plane warm-ups, new formulas have been derived. Latest findings show new proof of the importance of densification, and the desirability of compacting sandy layers to greater depths than now possible with ordinary compaction equipment. Bearing properties of sands tested are greatly affected by vibration.

In the ensuing discussion it was pointed out that a granular material can be compacted to a high density by traffic if not by rolling, and that the time element is an aid.

O. J. Porter, consulting engineer of Sacramento, checked conclusions of Mr. Hicks of North Carolina on the need for higher densities than are now generally being obtained for highways and airfields. He told of a density of 161 lb. per cu. ft. obtained to considerable depth on a test project.

#### Soil Strength Test

A progress report on the development and use of strength tests for subgrade soils and flexible base materials was presented by Chester McDowell, senior soils engineer, Texas highway department. Pointing to the common agreement that a strength test is needed, but that engineers differ on the procedure, he discussed the factors such a test should involve, listed obstacles, and outlined a tentative tri-axial test procedure for discussion. Based on the fact that strength test results are strongly influenced by inherent quality, density, dry curing, and confinement during absorption, his proposed test is based on studies pertaining to these factors.

Mr. McDowell explained that the test studies have fallen short of a perfect solution to date and invited comments and suggestions to help in seeking the admittedly important objective of a strength test for soil or subgrade materials that will take into account factors in the field.

#### Safe Roadside Planning

H. J. Neale in reporting on the committee on roadside development said that emphasis has been put on traffic safety this past year. Roadside planning must be considered as part of the complete highway, and

full consideration be given to traffic, topographic survey data, present and potential land use, etc. Air photography is an admirable tool for the roadside planner in considering the last named phase. Off-highway areas, turnouts and wayside recreational facilities loom high in their future work, and new legislation may be necessary to clear the way for desirable features.

#### Pavement Design Report

The committee on rigid pavement design has continued its joint project with certain states on long-time investigation of pavement joint spacing, according to a subcommittee report by R. D. Bradbury, PRA, read by L. W. Teller.

This committee will renew efforts to develop a uniform procedure for making condition surveys. It will also undertake a cooperative study of load transfer devices, an announcement which brought discussion from a manufacturer, Mr. Heltzel, who said that in his opinion there is no design problem at all in providing a successful load transfer and that manufacturers stand ready to make what the engineers want if only they will make up their minds. He spoke of nearing production on a hermetically sealed dowel which will better resist corrosion from the elements.

A New Jersey spokesman in further discussion favored more experimental sections in various states, and noted that the reason for the endless controversy over joints is that engineers in each state think in terms of their own experience and particular designs. Sweeping statements that a certain joint will function thus-and-such are based largely on local data. New Jersey as well as other states face unsolved design questions and still do not definitely know how widely to space joints, or what dowels are needed.

Joints and other structural details rather than the material itself are the cause of failures, noted Van Breman of New Jersey who described a concrete pavement placed in 1912. This road, 5 to 8 in. thick, was concreted with wheelbarrow methods, excess water being broomed off in finishing. Cores taken recently tested 7880 lb. The concrete hence is quite sound. The foundation, however, is poor and the principal trouble is that every sound piece of concrete has faulted. The joints and other details necessary to preservation of the pavement were not properly provided. The failure of this old pavement, as with more recent ones, is a failure of the engineer, not the material.

The best dowels and load transfer

devices will not take the place of an adequate slab design, warned R. R. Philippe of the U. S. Engineer district, Cincinnati, who has played a part in the design and testing of heavy airfield pavements.

#### Co-op Study of Joint Spacing

A progress report on the long-time study of joint spacing being conducted by PRA with several states was given by E. C. Southerland and H. D. Cashell of PRA. Among the findings to date expansion joints are found to close progressively with time, greatest closure taking place the first year. Closure continues until all expansion space is gone. The chief influencing factor is the total amount of available expansion space along the pavement. Contraction joints, on the other hand, open progressively, also changing fastest the first year. Contractions on the average opened least in states which have eliminated expansion joints or spaced them far apart.

A New Jersey engineer concurred with the report's findings, saying that New Jersey has experimented with redwood joints, spaced as much as 3,000 ft. apart. Dr. Gerald Pickett of Kansas State College challenged the paper on a point, raising the question as to just what constitutes an efficient joint. Degree of load transfer is only one factor in joint efficiency, he said, waterproofing being another. Deflection may be excessive, causing the subgrade to fail inelastically and lead to faulting, all from an "efficient" joint.

Advocates of incompressible or nearly incompressible joint material were heard, with the statement made that resistance of the expansion filler is a real consideration in controlling progressive closure or opening of joints.

#### Canadian Airfield Evaluation

One of the notable papers of the four-day convention was that of Norman W. McLeod, engineering consultant, department of transport, Canadian government. In a lengthy slide-illustrated paper he outlined the results of load capacity rating tests made on principal Canadian airports. The purposes were to learn more

The annual Highway Research Board Award for the best paper published in the last proceedings was given to K. B. Woods and H. S. Sweet of Purdue University and T. E. Shelburne of the Virginia highway department on a paper entitled, "Pavement Blow-ups Correlated with Coarse Aggregates."



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### Priority Is the Word

Down through the years in road building we have heard much loose talk about the economic need for highways. Any child can describe the importance of a given road to its community in general terms; any engineer in more specific terms. "You pay for good roads whether you have them or not."

The problem today is not to develop data merely to prove that an improvement should be made, but to show its urgency in relation to other urgently needed projects.

This point was brought out by state highway engineer Charles S. Noble of New Jersey in the planning session. "We can show such a tremendous mileage of economically justified projects," he said, "that the question is entirely one of priority." The problem in his state and in others is to develop facts to gauge localized benefits in relation to cost, town by town and area by area. In the case of entirely new routes such as New Jersey's new expressways the problem also is to determine whether one proposed route is better than another.

The traffic value of modern highways in relation to construction cost isn't a uniform thing, nor does the relationship follow a steady curve. For example, there is a sudden drop-off in this curve when going from two-lane to four-lane construction. The whole subject needs further study, listeners were told, and especially in determining the detailed location of inter-state routes through populous areas.

J. C. McMonagle, planning and

traffic director, Michigan, notes specifically that there isn't enough information usually on operating costs of vehicles, and too little urban data of various types required for proper analysis.

In Detroit the Willow Run Expressway was built early in the war on state highway planning data, which are also aiding in designing and locating the new John Lodge and Edsel Ford expressways in Detroit. Origin-destination surveys are still needed to complete the planning of the latter projects and integrate them into the city's street plan. A shortage of qualified urban planning engineers and technicians was noted by Mr. McMonagle, who also observed that local governments often require technical assistance on broad planning of projects vital to a region, and that constructive action must be taken to eliminate antagonism between city, state and rural groups involved. The solution of a metropolitan traffic problem is primarily a local task, to which the state should, however, stand ready to contribute.

In discussing New Jersey's expressway and arterial plans, R. E. Jorgensen of that state noted the significant fact that today the same design standards are followed regardless of the rate at which construction funds become available. This is in contrast with the old custom of tailoring road designs to the money available rather than the need as determined by economic studies.

about the moisture and density conditions of existing subgrades, and prepare curves to aid in future runway design.

The most noteworthy conclusion from this investigation is that Canadian airfields will be seriously over-designed if designed by the California Bearing Ratio method using soaked subgrade samples as followed throughout the war by U. S. Army engineers. This method gives 2 to 3 times the thickness indicated to be necessary there. From his data, Mr. McLeod outlined two new formulas or methods of designing flexible runway bases and surfaces.

A progress report of a special sub-committee on granular stabilized roads, H. F. Clemmer, chairman, con-

tained important conclusions. Dealing with the compaction phase only, it was based on work done in the soils laboratory at the University of Maryland. Calcium chloride influences the stability factors: water content, compaction and plasticity. The role of the ingredient in maintaining the moisture film in soil is well known, but less has been known about its effect on compaction, although calcium chloride has been generally credited with making less compactive effort necessary. Need was seen for tests to determine the amount of expected increase in density and the amount of calcium chloride to add to obtain maximum stability effect. Also unknown are the precise causes of the effects noted, conceded to be in-

fluenced by increased surface tension of calcium solutions over water, decreased vapor pressure of calcium chloride solutions, the existence of hygroscopic and delequescient properties of such solutions, and the base exchange in the clay fractions.

Three plastic and three non-plastic soil samples were used in the investigation, the Virginia highway department aiding in routine tests. Various percentages of admixture were involved, along with three different compactive efforts.

Conclusions: calcium chloride in amount up to 5% of the soil will cause an increase in the wet and dry density of the soil. For lighter compactive efforts, calcium chloride replaces water and so reduces void space. Under heavier compaction, it replaces some soil as well as water, still reducing voids.

Addition of calcium chloride up to 3% will greatly decrease the amount of compactive effort needed for a specified degree of compaction as much as 50% less rolling being indicated as a practical field result.

A more workable soil, contributing to easier placement and further compaction by traffic during curing, is indicated when calcium chloride is added.

### Controlling Skid Resistance

A report of a committee on anti-skid properties of road surfaces by Geo. E. Martin, Barrett Division, covered questionnaire data from the highway departments. Forty-three departments spot dangerously slippery sections from accident records. Six departments measure skid resistance with a machine: 24 states indicate a desire for such a machine. A few use or prefer simple brake tests. Six states reported that slippery roads were no problem.

The most common skid corrective is bituminous treatment. Nearly all grades of asphalt and tar are used in one state or another for this purpose, with some preferring lighter grades, and some using a preliminary treatment such as burning to remove excess bitumen. One state discs the surface of old bituminous surfaces before applying new treatment. Two states use a light application of rock asphalt instead of a liquid seal, with a light prime.

### Bituminous Treatment Performance

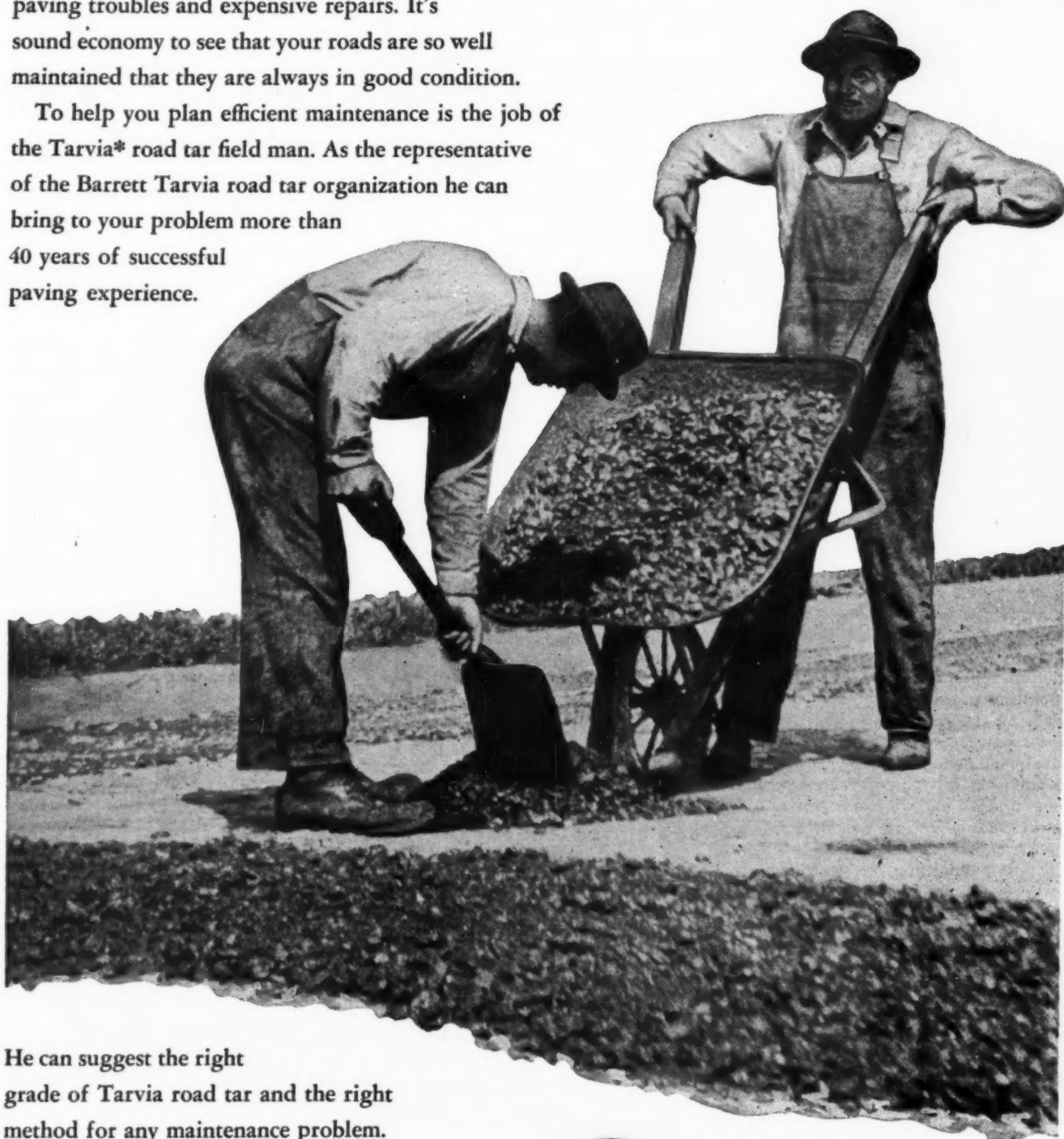
Interesting conclusions on bituminous treated pavement performance were drawn from a 7-year study of a test road by W. H. Goetz, Purdue University. A 10-mile test pavement was constructed on the Indiana state sys-



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tem, using 51 experimental sections involving 3 kinds of bituminous materials, 2 aggregate sources, variable applications and aggregate sizes.

Generally excellent durability of the road sections were ascribed to good soil conditions, a high, level profile, adequate base and low traffic density. Performance success was due more to care in getting a uniform grading and mix, and in careful workmanship, rather than to types of bitumen or aggregates.

During the seven years the surface area of exposed aggregate has increased 500 to 600%, and the percentage of bitumen in the treatment layer by weight has increased an average of 50% over the original content.

From this test Mr. Goetz concluded that road mixes can be expected to vary greatly, even with the best workmanship; that performance usually depends on aggregate size rather than source.

#### Economics of Highway Types

Economic comparison of highway types was the subject of an important paper by R. A. Moyer, Iowa State College. He noted that construction and maintenance of highway surfaces take 40% of highway department funds nationally—over a half-billion dollars annually (prewar average). Pointing to the serious need for more data on the economic factors in type selection, he said that gathering and analyzing such data are held back by a division of responsibility within the typical highway department.

Vehicle operating cost is just as much a part of the cost to the public of a highway improvement as other cost factors, but this cost is

Remember how soils and materials research used to draw the big crowds at the technical meetings? They still do, of course, but it is a noteworthy mark of the times that the sessions on traffic, planning, and economics and administration also drew large audiences at the recent research meeting. In particular some of the clearest thinking and most direct evidence of progress are coming out of the groups that meet and talk over traffic matters. With exceptions, of course, the speakers are markedly more able than those who dwell in the material lab, and fortunately so because traffic and functional phases of highway engineering must be taken to the public in three and four letter words.

still ignored or neglected in many states. Many highway departments, particularly in the middle west, are today building untreated soil, gravel or macadam roads which cost admittedly less to build and maintain than bituminous or concrete pavements; but such roads cost about 50% more for vehicle operation, and the question is raised as to whether it hence isn't cheaper to give the public higher type roads.

Traffic economics, in short, may justify higher type construction on a tremendous mileage of roads. There are today in this country 880,000 miles of gravel, stone or soil-built rural highways averaging 80 vehicles daily, and carrying 20% of all rural traffic; and 1,640,000 miles of non-surfaced roads carrying 10% of the traffic. In these groups lies the greatest opportunity of reducing vehicle cost by up-grading the surface. Assuming a per-mile operating saving of 1.25 cents or \$1.00 per day per mile, there is a theoretical saving possible of \$365 per mile, per year on the 880,000 miles, or \$365,000,000 a year by paving. A similar analysis for the unsurfaced roads presents a less convincing picture, but some of these roads need better surfacing to avoid serious consequences of traffic stoppage due to mud.

Prof. Moyer analyzed data from Kansas and Iowa roads covering a 10-year period, and taking in the elements of first cost, service life, salvage value, interest on investment, depreciation, maintenance cost, and vehicle operating cost. The latter cost averaged 3.90 cents for earth, 3.55 for gravel and 2.70 for pavement.

#### Obsolete Small Bridge Abutments

Old handbooks on small bridge design must be thrown away, counseled Jacob Feld, Consulting Engineer, New York City, in presenting the concluding part of a report on small bridge design. Reminding that there is a tremendous number of structures to be designed, and that there are twice as many abutments as bridges, he said that abutment design represents a particular source of waste due to uneconomic designs used. A thin-walled reinforced concrete abutment design would seem to be usually more economical than mass concrete, although the latter type is still frequently used. Sand backfill often is neglected as a means of contributing to cheaper design, and it may pay to import good sand in place of local materials for backfilling. First cost is an all-important factor in ultimate economy, since other factors are fixed.

#### Resurfacing Notes

Interesting observations on resurfacing of worn-out pavements were presented in a committee report by N. F. Schafer of Indiana, who noted a marked difference of opinion on resurfacing methods and as to whether and when to resurface. Some states have resurfaced hundreds of miles, while others have yet to place the first mile. Probably a great many resurface projects should have been reconstruction. The Committee's research, eventually to be released, covers high, intermediate and low-type resurfaces, a study of existing pavements, and the design and construction practices.

On the subject of old concrete resurfacing with bituminous mixtures, W. R. Wooley of PRA noted that little data have been published to support reasons for resurfacing, although plenty of articles have appeared on methods used. From a rather sketchy 3-year observation of resurface projects in three mid-western states, Mr. Wooley worked out an analysis showing that resurfacing at assumed prices is cheaper than continued patching when concrete patch areas exceed 1.7% annually. This interesting analysis is based on assumption of \$1.00 per sq. yd. bituminous resurface cost-in-place, including incidental improvements, and 10 years' service at 10 cents per sq. yd. annual maintenance, with concrete patching costing \$6.00 per sq. yd.

He made a similar analysis based on 15 year life of the resurface, which would normally need seal coats periodically after the tenth year. However, he noted the tendency of seal coat and chip material to be thrown off by traffic, and hence a complete resurface with an additional layer of bituminous mix is indicated at the 10th year for arterials.

#### Traffic Wheel Paths

Progressing methods of recording the lateral position of vehicles on the open roadway and while approaching and crossing bridges, was described by F. H. Green, Purdue University. "Speed traps" now are used to electrically record speed and deceleration at bridges. These data correlated with lateral-position data obtained with electrically operated motion picture cameras mounted on the bridge, give the picture of driver habits at bridges. More such information is needed to aid in improving roadway designs at bridges, where thousands of accidents occur.

[See next month's *Roads and Streets* for additional notes on the Highway Research Board Meeting.]



# STANDARD ENGINEERS NOTEBOOK



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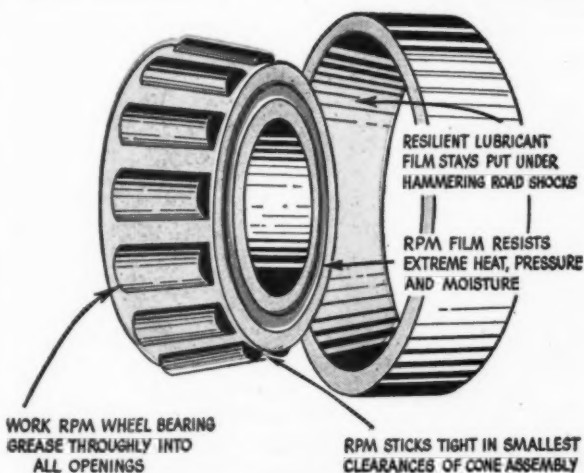
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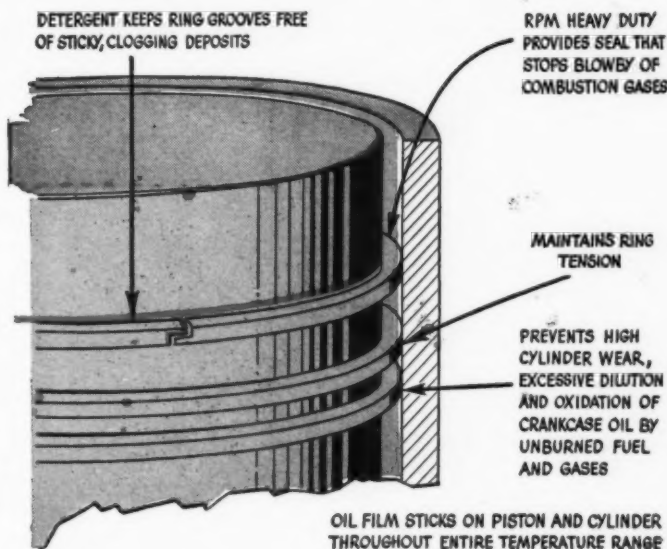
Handy guides that assure this are the free Standard booklets, "How to Service Wheel Bearings." There's one for light equipment and one for heavy equipment. Send for your copies.

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This special heavy duty oil contains patented additives which remove sticky gum, carbon and lacquer from rings and ring grooves, keeping rings free so they can expand fully. With rings expanded, the tough lubricant film of RPM Heavy Duty Motor Oil forms a seal between rings and cylinder which prevents the force of combustion from driving gases and fuels down the walls.

RPM Heavy Duty Motor Oil sticks to metal at all operating temperatures. This assures unsurpassed lubrication at all times on surfaces of cylinders, pistons and rings, reducing wear to a minimum.

RPM Heavy Duty Motor Oil will resist sludge formation even in coldest operations, will not foam or corrode bearing metals.

FOR EVERY NEED A **STANDARD OF CALIFORNIA** JOB-PROVED PRODUCT

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summer of 1945 and was completed in December, 1946.

In 1946 Henderickson Bros. performed the excavation at bridge sites under a subcontract with Andrew Weston. Bridge by Weston 1946-47, original grading between bridges by Henderickson 1945-1946.

Ditches will remain until removed in pavement contract.

Wire rope economy depends, to a large extent, upon selecting the proper grade of steel, together with the right rope construction for the job at hand.

### Subdrains Installed with "Back Spade"

A drag shovel boom of  $\frac{3}{4}$ -yd. rated capacity, mounted on a 6x6 army truck and equipped with a 12-in. wide arc-shaped "back spade", speeded herringbone drain placement for G. H. Lowe of Cedar Rapids on a grading contract south of Allison, Iowa, last summer. Built by an Iowa manufacturer (known as the Scheids Bantam), this rig caught our eye because of its use in making narrow, shallow trenches such as are needed for stone backfilled subdrains. Longi-

tudinal shoulder drains and diagonals through a cut were being installed when the pictures were taken.

Shown in one scene are supt. Eschman and res. engineer Leo Lawton.

Another view shows a special "sieve type" bucket devised as an attachment to the drag shovel arm in place of the hoe, for sluicing wet stuff out of water filled trenches.

Professional tree surgeons have been give a contract in New York state for removing dead trees and pruning trees along certain scenic roads in Westchester County.

★ (Left): Ditch along inner edge of shoulder, with diversion in foreground leading to catchbasin grating.  
(Right): Centerline ditch, connecting via a diagonal to ditch along base of slope through the cut







★ Cars on the left back into diagonal stalls, parking with radiators pointed uphill. No danger of cars getting loose due to insufficient braking

### Diagonal Back-in Parking on Hilly Street

At Lancaster, Ohio, one of the blocks fringing the downtown shopping center is on considerable of a grade. Diagonal parking is permitted on both sides of this block, and several mishaps occurred due to failure of car owners to lock their brakes securely when parking on the uphill side.

As shown in the accompanying photo the solution was to paint the diagonal stall lines at the opposite angle, so that cars must be backed in, coming to rest downhill against the curb. This trick is working well, we understand, aided by the fact that Lancaster is a fairly small community and residents soon caught on.

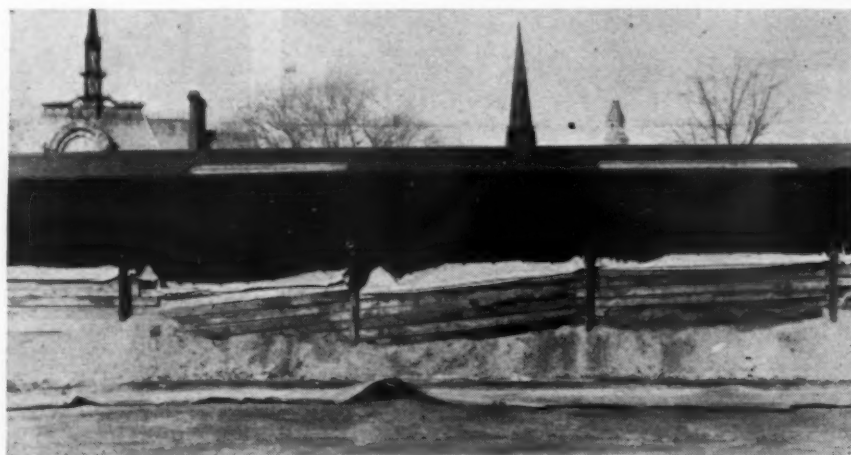
### Open Salt Storage

Hartford, Conn., which established quite a reputation as a snow-free city last winter by spreading rock salt on the streets, is trying something new in local operations this winter—open storage sheds for this season's rock salt in the Street Department yard at 99 Van Block Avenue. Royal W. Thompson, Superintendent of Streets in Hartford, converted these bins to rock salt storage so that he could keep adequate supplies on hand for use whenever he needs it. The sheds, tightly roofed and closed on three sides, have a "floor" of heavy paper spread on the ground. The open side makes it easy to remove salt with a mechanical truck loader and in that way helps to speed up snow removal operations.

### Heavy Equipment Operators Get "Exams" in New Jersey

Operators of maintenance equipment seeking jobs with the New Jersey state highway department were put through an open competition and promotional examination recently. For two days operators ran bulldozers, cranes, shovels and heavy truck trailers under actual working conditions, while observed by experienced operators and representatives of the state civil service commission. Separate trials were held for truck drivers as a means of evaluating applicants.

In handling bulldozers the applicants were required to move earth to a given location and specific grade, while crane and shovel tests laid emphasis on ability to maneuver equipment into position and perform various customary tasks. Truck trailer candidates were made to load a roller and to park in specified locations and drive round obstacles.



(Continued from page 74)

for Pearl Harbor, was entertained there for a few days and returned by Navy plane to California.

Mr. Rabel brought back information that government surplus in the Hawaiian Islands is valued at \$180,000,000 and located in about 80 different yards and warehouses. Sales in the Islands are conducted much as they are here, with little of the good equipment surviving priorities and reaching public sale.

That all Government surplus west of the Hawaiian Islands had been sold to the Chinese Government for \$50,000,000 to \$60,000,000 to assist in rehabilitating millions of peasants in the war-torn interior of China, was the current rumor heard by Mr. Rabel. But also according to the rumor much of the equipment is being diverted for resale to Australia, India, etc. And the Chinese people for whom it was intended look upon the benevolent actions of the United States as so many empty promises.

Although WAA has reported that the surplus disposal job will be completed by June, 1947, the AED Committee feels there are several years ahead in which there will be surplus disposal.

The AED national survey found that due to inefficiency in regional WAA offices, notices of sales do not arrive in the hands of possible buyers in time for them to participate. The AED Executive Office is working out a rapid way of getting its members notified of coming sales in time to be of use.

**Anti-Diversion Amendment Adopted by Texas**—Texas is the latest state to prohibit diversion of highway funds by a constitutional amendment. At the Nov. 5 election this amendment was adopted by a vote of approximately 4 to 1. Nineteen states now have such an amendment.



## What One Paving Contractor Does in WINTER

Denton Construction Co. of Detroit renovates equipment and sometimes rigs up special units in its spacious, neatly kept shop and yard

SEVERAL road-building contractors in the Detroit area have emerged into postwar days with sizable yard and shop layouts. One of the clan who believes that it pays is Leet Denton of Denton Construction Co. While having an office in Detroit, this company has its yard in suburban Royal Oak, where land was available to spread out a bit.

Denton specializes in concrete paving, and has built his facilities somewhat around his specialized needs. On a five-acre plot, accessible to rail siding and to arterial highways, the firm has assembled the seven buildings pictured in the accompanying "panorama" photo.

### Converted Barn

The largest building, on the right,



★ General view of the Denton Construction Company plant at Royal Oak, Mich.

★ Denton's main shop was once an old barn. A much higher door than the one shown was built on the other end, as entrance to a two-story-high repairing bay for pavers and cranes



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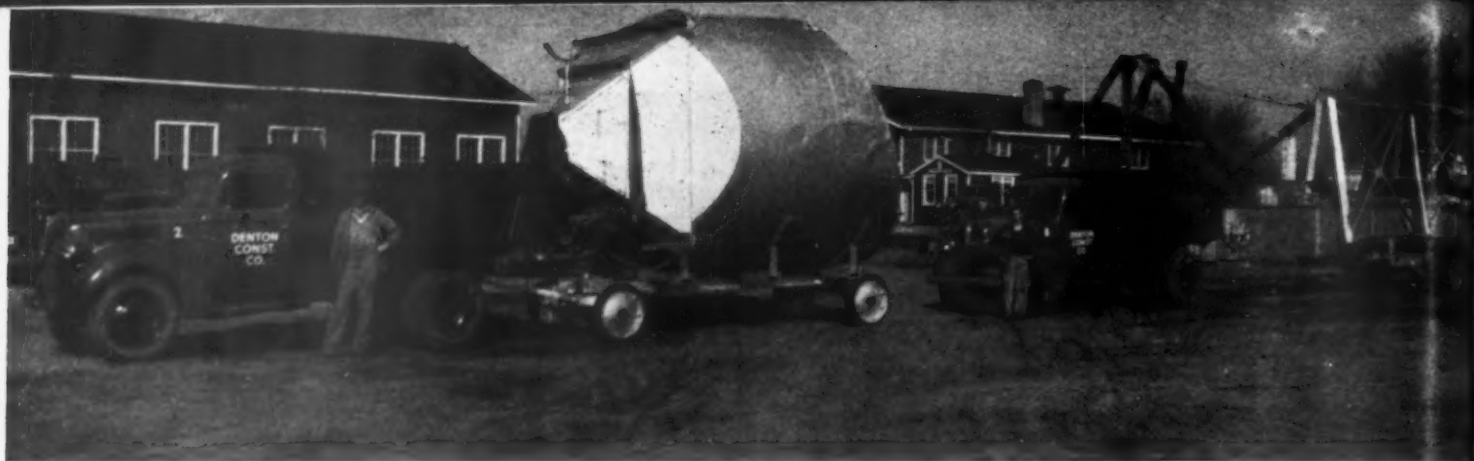
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★ On the march—bulk cement plant sections loaded on special trailers



★ Denton's paint shop, using floor panels from old CCC camp barracks for the walls

is the main shop. This 45 x 80 ft. 2-story building was originally a barn. Today it houses what little machine shop equipment the company thinks it profitable to own, and is the scene of general motor and equipment overhauling. The rather low (13-ft.) ceiling is ample for smaller equipment. In order to accommodate bigger units, a 20 x 30 ft. area of the second floor was cut away at one end and a high, wide door built, to give a 2-story-high working bay. A 34-E dual drum paver occupied this space this January while its frame and parts were thoroughly cleaned, repaired and painted, the machine then being trundled out in the yard to await certain scarce parts.

A freight elevator, built in one corner of the garage, leads to a stock room on the second floor. Here are kept small tools and parts. Denton watches the parts supply carefully, stocking lightly on parts readily available from local distributors. He does, however, keep an arbitrary number of certain hand tools always on hand and in good condition; the clerk automatically re-ordering if, say, the hand shovel inventory falls below a hundred, and so on.

During the past five years the company policy has been to save all old parts and pieces of chain, etc., since no one knew when a pile of such "junk" would yield a scarce item which would literally keep a job going. Now the men are taking spare hours to sort and dispose of much of it as scrap.

★ Bulk cement plant good for 920 bbls. capacity. Both bins are fed by the single screw and elevator. Note motor high above the dust

★ A pair of trailer-type field houses, each comfortably housing three desks and a small drafting table







★ Several of Denton's trailers, loaded with concrete batch bins and other equipment



★ Leet M. Denton

### Home-Made Buildings

During the winter of a year ago Denton's men assembled several of the present buildings, using material from old CCC buildings dating from depression days. Sectional floor panels were converted into wall sections. One building erected in this fashion is the long, windowless structure seen in the far left background of the general view. This is for dead truck storage. The 3-window building immediately back of the paver, built also from CCC building parts, is the company's paint shop.

The open structures shown are for storing motorized equipment partly out of the weather.

### Field Offices

The shop men are specially proud of the two mobile field offices pictured. These are 8 x 25 ft.—each large enough to comfortably house three desks, a counter, file cabinets, and an oil stove. The modern and clean interiors are insulated and finished with wall board.

And note that the whole cluster of buildings shows the marks of good housekeeping. They had been freshly



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**DEPENDABLE** heavy duty tools for pulling and installing bearings, gears, sleeves, wheels, shafts and other close-fitting parts. Made of high alloy, drop forged, heat-treated steels, precision machined—strong, easy to handle, portable, **SAFE** to use, **FAST-working!** Approved by Hyatt, M-R-C, New Departure, SKF, Timken, and by Tractor Manufacturers.

**OTC PULLERS and Attachments, BOX WRENCHES** and other tools in sizes to handle practically every maintenance job.

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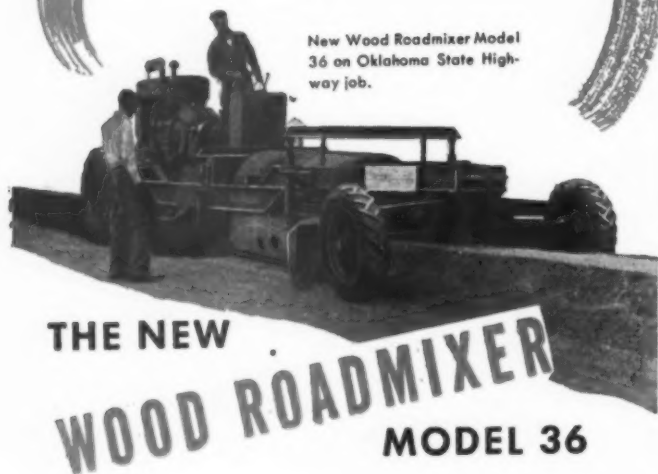
Write for new Catalogue RS-101 of Engineering Instruments, Engineering Field Equipment and Drafting Room Supplies.

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It is printed in Spanish with a section in Portuguese. Manufacturers of equipment and materials seeking an export market can reach the key buyers through CAMINOS Y CALLES without waste circulation. It is distributed to all Latin American countries and furnishes a CCA audit of 10,700 circulation.

Large credit balances have been built up in the U. S. by these Latin American countries. They are in need of all types of road building equipment—and they like it American made!

## *New — Catalog Issue*

A new Reference and Data Catalog section will be incorporated in August 1947 issue of CAMINOS Y CALLES. This will give the manufacturer a place for his Catalog message to this specialized group—a year-round-interest issue. Be sure to plan for this special issue in your 1947 budget.

**Write for particulars on  
Caminos y Calles and on new  
Reference and Data issue.**

# *Gillette*

**PUBLISHING COMPANY**

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painted at the time these photos were taken. They still look neat, as do the buildings' interiors, which all have concrete floors kept clean with plenty of broom power and hose application.

### Cleaning Road Forms

(See next page for photos)

Typical of the thoroughness with which all Denton equipment is renovated each winter is the manner in which concrete paving forms are handled. The company currently owns about 8,000 linear feet of forms, and this past season they saw plenty of service.

Forms are trucked into the yard and set off near the door of a small concrete floored building which houses an electric welder and tools. Form sections, weighing up to 250 lb. each, are handled by two men, who transfer them from a tractor-drawn stone boat onto saw horses just inside the shop door. First the welder fixes any broken stake brackets, etc. Then the forms are straightened and cleaned with the usual hand tools. As each section is fixed up, it is heaved on the sledge, which takes its load several hundred feet to a dipping vat near the outdoor storage pile. A small tractor equipped with a front end loader, or other convenient mobile lifting device currently available, unloads the sections to one side, then picks them up one by one, dips them in a vat of form oil, and sets them carefully on the stock pile, where they are covered with concrete curing paper for weather protection.

Three men are required at this end, making six on the form cleaning crew in all. This crew repaired and stacked the entire 8,000 ft. in about three weeks this winter.

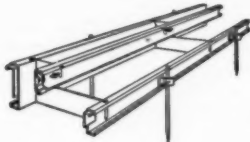
Mr. Denton, like many another contractor, is on the lookout for a better way to reduce hand labor in transporting, handling, setting, removing and cleaning forms. Good workers are so scarce today that it has been quite difficult to get or keep a willing crew on the project—the fellows are prone to leave stakes out or skimp on bedding the forms properly, unless watched constantly. The Michigan state highway department is known to be a stickler for good forms and accurate form setting. Various mechanical methods for loosening, pulling and loading forms for sending up ahead of the paver have been considered, the principal difficulty being lack of travel room alongside the new slab.

### Special Cement Bin

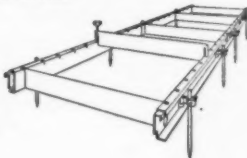
In previous issues of *ROADS AND STREETS* we have described some of the special concrete finishing equipment devised by the Denton Construc-

# STEEL FORMS

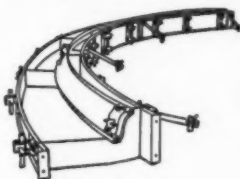
**Curb Forms...** Sections 10' long for either straight face or battered face construction. Steel forms for all special concrete curbs.



**Combined Curb and Gutter Forms...** Each 10' section consists of 1 each of back curb form, front gutter form and face curb form, also 2 each of face curb form supports, round stakes for back form and round stakes for gutter form.

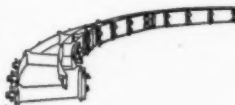


**Sidewalk Forms...** 10' sections, slotted 12" for division plates, which are removed without disturbing side forms after concrete takes its initial set.



**Rigid Radius Forms...** Used for building concrete curbs or curb and gutters when all intersections or corners must match. Heltzel forms made in sets to form a specified radius.

**Flexible Forms...** Used when building radius curbs, curb and gutters or sidewalks where the radius is subject to frequent change or for serpentine work in park areas.



Heltzel Steel Form & Iron Company, Warren, Ohio

SEND ME STEEL FORM CATALOGS:

☐ B-19 Steel Highway and Airport Forms

☐ B-19A Steel Dual Duty Airport Forms

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(Type of construction usually engaged in)

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BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)  
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ROAD FORMS (with lip curb and integral curb attachments)  
CURB FORMS  
CURB AND GUTTER FORMS  
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TOOL BOXES  
FINISHING TOOLS FOR CONCRETE ROADS



★ Welding, cleaning and straightening of forms are done in a small open-doored shop when weather permits, and sections transported by stone boat. A power loader proved ideal for handling forms during dipping in the oil vat and stacking

tion Co., either to meet the wartime equipment scarcity or to adapt or convert available units to a special need. A further example of equipment resourcefulness is the double-bin bulk cement plant pictured. In order to get more on-the-job storage capacity to offset a local shortage of bulk delivery trucks, Denton has a special 570-bbl. auxiliary bin manufactured in 1946 to hook up with a standard 350-

bbl. bin already owned. As shown in photo (p. 104), the bins stand next to each other. A single screw hopper and elevator serve the combined system, feeding into the higher bin until it is full after which the overflow fills the lower bin.

Note also another feature of the bin arrangement—the elevator motor is located high out of the cement dust.

This outfit is unbolted and hauled

to and from the job in sections, using trailer equipment which was also built by the winter shop crew. Two of the trailers (one being only a dolly) are shown in one of the scenes.

The spark plug for all this activity, aside from Mr. Denton himself, is his general superintendent, Charles Ledurman, who is working about fifteen men this winter in anticipation of a busy 1947.

## Well-Known Speakers for AED Convention

The Associated Equipment Distributors will hold their 28th annual meeting Feb. 13-15 at the Edgewater Beach Hotel, Chicago, Ill. Prominent leaders in many fields have been secured as speakers. Among them are H. E. Foreman, Managing Director of AGC; the Rev. Dr. Preston Bradley, Pastor, The Peoples Church, Chicago; Charles M. Upham, Engineer-Director of ARBA; Kenneth R. Wells, Assist. Vice-Pres., American National Bank and Trust Company of Chicago; Horace H. Hull, Pres., Hull-Dobbs Company, Memphis, Tenn.; and Elmer Wheeler, Pres. of the Tested Selling Institute of New York City.

A pre-convention meeting of the 1946 Board of Directors will be held Wednesday, Feb. 12. Also on that day the AED Committee on Disposal of Government Surplus will meet,

Ed P. Phillips, Richmond, Va., chairman.

The first day of the convention will be devoted to registration, committee meetings in the morning, the First Session under AED President F. B. McBath, of Portland, Ore., in the afternoon.

During the Second Session, presided over by AED Exec. Vice-Pres. W. A. Danner, Hyde Park, Mass., morning, Mr. Phillips will talk on the disposal of government surplus, discussing its status now and the effects it is having on the construction machinery industry.

Six speakers will feature the afternoon session, at which AED Vice-Pres. A. F. Garlinghouse, Los Angeles, Calif., will preside. Mr. Foreman will talk on "Construction Problems as Seen by the Contractor." Mr. Hull will have as his subject, "Is Free Enterprise on Trial?" Next, Hal M. Davis, Houston, Texas, Chairman,

AED Planning and Promotion Committee, will give the "Program Objectives for AED."

The activities of the Canadian Association of Equipment Distributors will be related by its President, V. J. Sheridan, Leaside, Ontario. Mr. Wells will discuss "Financing Construction Equipment."

Three group meetings will discuss problems of the industry. Eldon M. Farnum, St. Louis, Mo., Chairman, AED Rental Committee, will lead a discussion on equipment rentals; F. W. Tarr, Chico, Calif., Chairman, AED Business Administration Committee, on business administration; and Harry J. Hush, Griffin Equipment Corporation, New York, on the servicing of equipment.

During the closing session AED Vice-Pres. C. F. Halladay, of Sioux Falls, S. Dak., will preside. Mr. Upham will speak on "Road Building Progress for 1947."



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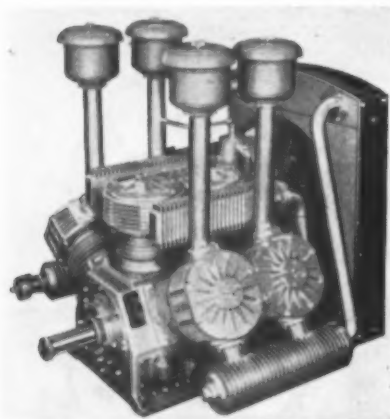
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STAKE and DUMP BODIES  
HYDRAULIC HOISTS  
**FOR ANY TRUCK**  
STANDARD or SPECIAL UNITS  
IN ALL SIZES • FOR ANY USE

## New Construction Equipment and Materials

1.

### New Air Compressors

A complete new line of air-cooled portable air compressors for 1947 has been announced by Davey Compressor Co., Kent, O. This includes five models of 60 - 105 - 160 - 210 - 315 c.f.m. ca-



New Model 315 Compressor

capacity. All units are of V-type cylinder design, except the Model 315. The latter is of "W" construction with four low pressure and two high pressure cylinders. Units operate at relatively slow piston speeds through the use of short piston strokes (4½ in. for Models 60 - 105; 4 in. for Models 160 - 210 - 315). Aluminum alloy compressor heads and manifolds are utilized in all models. Other features include crankshaft mounting on heavy duty double row ball bearings, full force feed lubrication and individual air cleaners for each low pressure cylinder.

2.

### New Hard-Surfacing Electrode

A new hard-surfacing rod developed by American Manganese Steel Division, American Brake Shoe Co.,

is a low cost, high carbon, chrome, molybdenum, shielded arc electrode that can be deposited on any ferrous base metal. It will produce, as deposited, hardness of approximately 400 to 500 brinell, depending upon the degree of dilution from the base metal. It is stated to be ideal for a wide range of applications where it is desirable to protect ferrous parts, subjected to severe abrasion with or without impact, with an overlay of a more resistant material.

3.

### New Tamping Roller

A new heavy duty tamping roller, designed to meet a wide range of compaction requirements, has been added to the construction equipment manufactured by the Wm. Bros Boiler and Manufacturing Co., Minneapolis, Minn. This new tamper,



Model G-2 Tamping Roller

Model G-2, has an average pressure on each foot as follows: Empty drums, 2,350 lb.; water filled drums, 4,000 lb.; wet filled drums, 5,660 lb. The T. roller has a shipping weight of 18,800 lb. This oscillating type roller consists of two 76 in. drums, designed around a "full floating" pole, which allows for

full individual drum oscillation with either angular or parallel lifting. The feet are diamond tapered. The drums are surrounded by a box type frame, centered on the drum axle to prevent off-center loads but the pole is so mounted on each as to produce the straight line pull with the tractor drawbar. Each roller has a stationary welded axle, supported on each end with self-aligning ball bearings, dust and dirt sealed and pressure-lubricated. Drum cleaner teeth on the G-2 Tamper are constructed of heavy duty channel steel, properly reinforced and adjustable for take-off.

4.

### New Vapor Steam Cleaner

A new vapor steam cleaning machine for cleaning construction equipment has been announced by White Engineering & Mfg. Co., Rochelle Park, N. J. Designated as the White vapor steam cleaner Model MO-46B, the new machine is manufactured either as a stationary unit with base, a movable unit with casters, or as a trailer carried unit. A feature of the equipment, two easily accessible valves enable one man to operate the machine and pressure, once set, is auto-



New White Vapor Steam Cleaner

## Mail Inserted Card

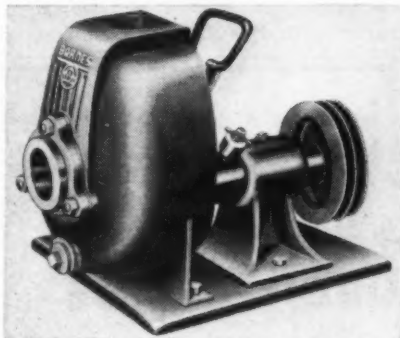
for data on equipment described on these pages. See also inquiry blank on page 130.

matically controlled throughout the cleaning operation. There are only four valves on the whole machine. Adjustment of the mixture is made possible by one of these two valves, which permits regulation from full concentration of cleaning compound to clear vapor for rinsing. Another feature of the unit is a system of instantaneous electric ignition which enables the working pressure of 100 lb. to be rapidly reached, eliminating waiting for unit to warm up or any need for pre-heating. Operating pressures 75-125 psi. Normal pressure is 100 lb.

## 5.

### New Universal Drive Pump

A new universal drive automatic centrifugal pump is now in production at the Barnes Manufacturing Co., Mansfield, O. This new unit with 1½ in. suction discharge has a capacity up to 5700 gal. per hour and pressure up to 35 lb. per sq. in. This 3MU model incorporates all standard Barnes features including automatic prime. This unit can be driven from any available power source, either electric motor or gasoline engine, which the user may already have. The



Model 3 MU Centrifugal Pump

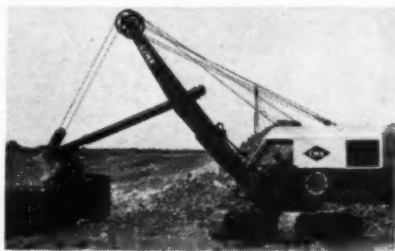
pump is equipped with a heavy-duty coupling head, incorporating double ball bearings. The shaft, made of highly polished, case hardened steel, is mounted on ball bearings to carry the radial load. Available as an accessory is a type A, 2-groove ¾ in. bore pulley for belt driven applications. Direct drive can be accomplished with either gasoline engine or electric motor power source by means of a shaft coupling. Electric motors, from 1 H.P. to 4 H.P. at speeds from 1750 to 3300, can be used to power this pump, resulting in performance from 61 G.P.M. through 95 G.P.M.

## 6.

### New 1½ Cu. Yd. Shovel

A new 1½ cu. yd. shovel crane and dragline has been announced by the

Shovel and Crane Division of Lima Locomotive Works, Inc., Lima, O. This Type 604 has been thoroughly tested under actual job conditions. The boom is of box-type, electrically welded steel construction with wide flaring base. The dipper handle is a single unit with one-piece racking. The dipper

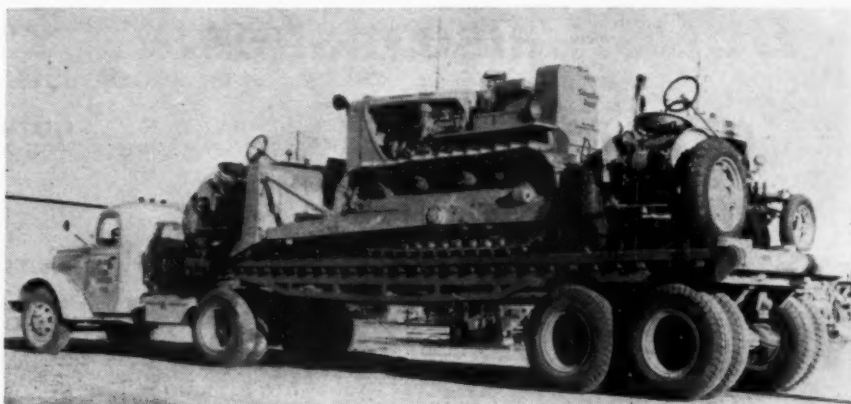


is full 1½ cu. yd. capacity, designed for quick easy filling and dumping. The Type 604 is equipped with an independent chain crowd. When the machine is working as a crane it has a capacity of 30 tons at 12 ft. radius. Dragline capacities are variable depending upon boom length and nature of work. The crawler truck construction is the small, dolly roller type with end drive principal. The truck base is a one-piece casting with center pintle, axle supports, conical roller path and gear case cast integral. The Type 604 is equipped with "Precision" air control on all major functions.

## 7.

### Hydraulic Pressure Tire Remover

A device that by means of hydraulic pressure removes all sizes and types of tires from any rim or wheel in a few minutes has been announced by Lee Engineering Co., Pawtucket, R. I. The pressure is applied through eight tested, steel fingers against the bead of the tire to remove the rim. No hammers, chisels, sledges or tire irons are needed. The demounters are made in six models, ranging from a motor driven stationary model to a



Self-loading trailer of maintenance division state highway department of South Dakota

hand operated portable unit. There also is a special machine for airport use. The Model A that demounts all size tires, up to and including 56 in. airplane tires, is a hydraulically operated electrically motivated machine. The hydraulic action is developed by a double acting hydraulic cylinder (70,000 lb. capacity). Pressure is developed by a hydraulic pump driven by a 3 h.p. motor. Model B is a hand operated type. Pressure for demounting is applied with a screw type handle, operating on a thrust roller bearing. In the Model B2, hydraulic action is developed by hand operated, hydraulic



Demounter with hand-operated hydraulic pump; which in turn operates a high pressure, hydraulic cylinder. No motors or compressors required. Cylinder is double acting and has better than 60,000 lb. capacity.

## 8.

### Self-Loading Trailer

A 26-ft. Fruehauf trailer of special design is one of two recently installed by the South Dakota state highway maintenance department for hauling heavy equipment to and from district shops and to jobs. In loading, the nose of the trailer is tilted down so that self-propelled machinery goes aboard under its own power. A winch mounted on the tractor lifts the loaded trailer onto the coupler.



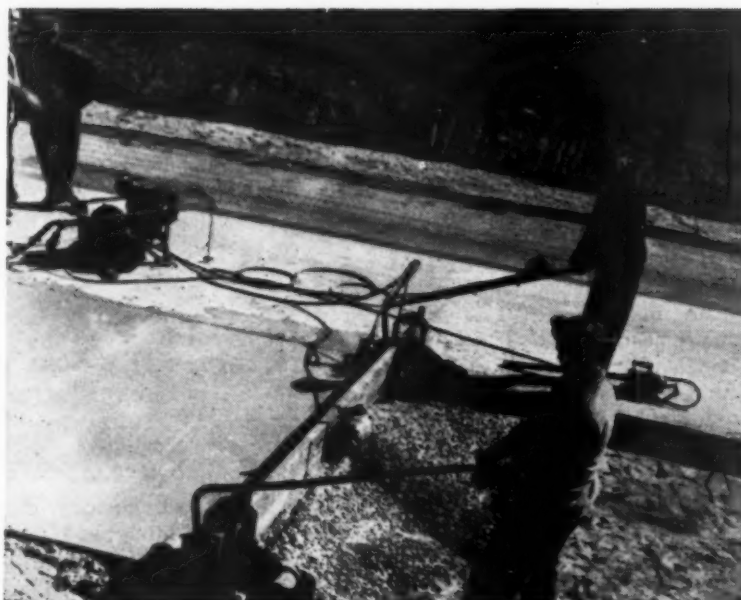
9.

### Concrete Vibrating Equipment

Three new additions to the "Jackson Line" of the Electric Tamper and Equipment Co., Ludington, Mich., are shown in the illustration. The vibratory hand screed is designed for use on jobs where it would not be practicable to use a large mechanical finishing machine. In the illustration the vibratory screed is shown in placing and finishing operations on a concrete highway patching job. The screed acts as a mechanical strikeoff and the vibrations are imparted by the vibratory motor into the concrete.

The Model M-1 power unit shown in the picture is powered by a 4 HP single cylinder Wisconsin engine belt connected to a permanent magnet type generator.

In the background of the picture, just beyond the far screed operator is the new Model FS-7A Jackson electric motor driven flexible shaft concrete vibrator. This vibrator is stated to be extremely useful wherever joints and edges must be consolidated. It is powered by a 1 1/4 HP electric motor capable of producing vibratory frequencies of between 6500 and 9000



New additions to "Jackson Line" of Electric Tamper & Equipment Co.

R.P.M. when submerged in concrete. The frequency varies with the size of the vibratory head, length of flexible shaft and consistency of the concrete.

10.

### New Truck Mixer

Substantial improvements in the

design and construction of Smith-Mobile truck mixers have been announced by The T. L. Smith Co., Milwaukee, Wis. The mixers will have larger drums with increased capacities and will include refinements such as: Selective dual water injection system for job mixing or mixing in transit . . . Fully enclosed water



Truck Patrol with the new BURCH TILTLEV BLADE

### BURCH also makes:

Chip-it-overs  
Force-feed spreaders  
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- Fits any standard heavy-duty truck
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pump valve and piping within motor housing to afford complete protection in cold weather . . . Syphon-type water tank equipped with a single lever-operated, poppet-type, three-way valve . . . Self-adjusting metal sealing door which automatically compensates for wear . . . Improved three point suspended transmission as-



New Smith-Mobile Truck Mixer

sembly with rubber mounting for bearing and gear case . . . Timken bearing equipped front drum support . . . Quickly accessible clutches . . . Complete streamlined enclosure for greater safety. Although these improved Smith-Mobiles have larger drums that conform to the new N.R.-M.C.A. standards, also thicker drum shell and blades, improved design and functional styling have made it possible to lower the weight per cubic foot of drum volume. Four sizes will be available: 2 yd., 3 yd., 4½ yd. and 5½ yd. truck mixers; 3 yd., 4¼ yd., 6¼ yd. and 7¾ yd. agitators.

## 11.

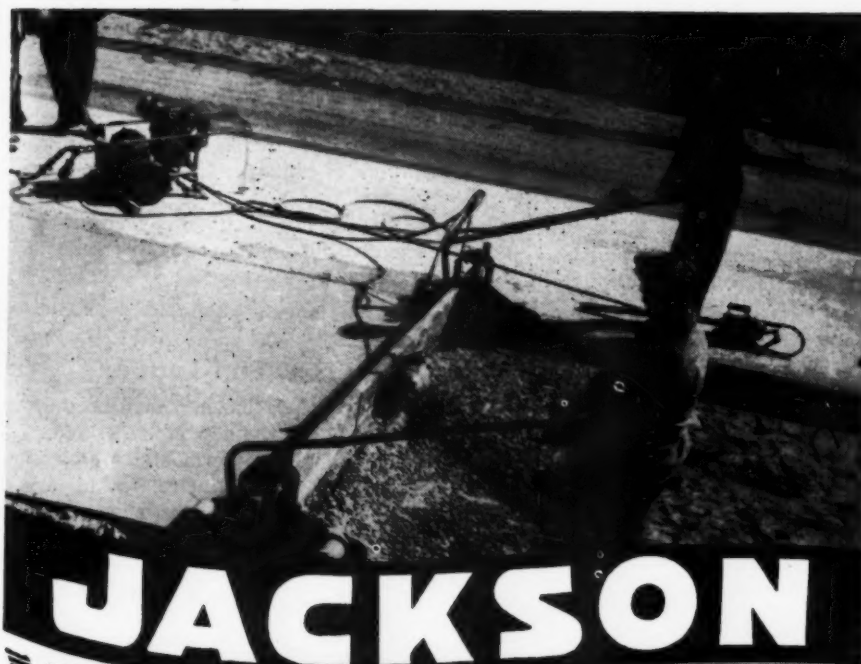
### New Portable Fueler for Construction Equipment

Portability, compactness and quick starting in cold weather are features claimed for the new handpack gasoline dispenser now being offered by Smith Meter Co., Los Angeles, Calif. It may be used at fixed location or



Handpack Gasoline Dispenser

mounted with tank on any type of vehicle. Will deliver gasoline from any kind of container . . . metering up to 30 gal. per minute. Services farm and contractors' equipment, small airplanes and performs many similar



# JACKSON VIBRATORY SCREED MODEL SC-200A

The Model SC-200A is unquestionably the handiest, most efficient hand screed ever built and offers the widest possible scope in concrete surfacing operations such as floors, ramps, decks, platforms, sidewalks and similar construction. Also adaptable for placing concrete on short or odd sections of municipal pavement where mechanical finisher is impractical. Gives complete puddling to low-water content concrete, assuring the ultimate in wearing surface and economy of cement. Has self-propelling tendency in the forward direction. Second passes made by simply tilting and rolling back the necessary distance. Gets right up to walls. Stands upright by itself. Double handles for two-man operation; cross-bar furnished for one-man handling of screeds not longer than 9 ft. Operates on commercial power but preferably from Jackson Power Plant which provides quick change of vibratory frequency to handle wide range of concrete mix and placing conditions, assuring thorough puddling under all circumstances. Don't buy any hand screed until you have the facts concerning the JACKSON SC-200A. See your Jackson Distributor or write, NOW!

*The  
Handiest  
most  
Efficient  
Hand Screed  
ever  
Built!*



Above: Tilted for second pass.

The self-propelling tendency makes little more than guidance necessary in the forward direction.

ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON, MICH.

transfers of liquid in small quantities. No auxiliary power required. It is stated to complete the average job in cold weather in less time than required to start conventional gasoline engine driven pump. Complete combination includes aluminum Smith rotary meter with 1½ in. outlet, air eliminator, strainer, built-in back-pressure valve and hand pump. Measures 22" long, 9" wide, 17" high. Weighs approximately 50 lbs. depending on which of several counters is used.

## 12.

### New Loader

Many new design features are embodied in the new Model 3 force feed loader announced by Athey Products Corporation, Chicago, Ill. With "Fin-



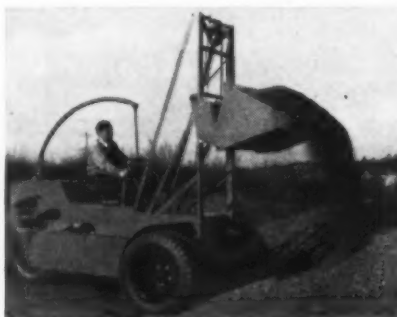
Model 3 Athey Force Feed Loader

ger-Tip" hydraulic control, the new model provides four levers for raising and lowering feeder, moldboard, throat and conveyor. This, and such features as roomy operator's platform, new conveyor and throat design, positive belt alignment, more accessibility, greater loading efficiency, are brought out in the announcement of the model.

## 13.

### Front End Loader

Major improvements have been incorporated in the new Model B Scoopmobile of the Mixermobile Manufacturers, Portland, Ore. Complete control of the bucket is now accom-



New Model B Scoopmobile

plished by means of two hand levers controlling an entirely new pick-up, hoisting and discharging mechanism. It is now possible for the operator to pick up a full load from a stock pile without "shock loading". Design of the bucket itself has been changed to eliminate spillage over rough terrain. It is now possible to discharge partial loads, due to the fact the bucket can be placed in any angle and closed at any time during discharge operation. Digging angle can now be controlled without lowering bucket to ground. The bucket can be quickly removed and replaced with various other attachments including lifting forks, for lumber, boxes, building materials, hay, straw, manure, etc. Other standard attachments include a concrete hopper, lifting crane boom, and additional track extensions to increase track height up to 18 ft. The standard Scoopmobile weighs approximately 5300 lb. and overall length is only 14 ft. Turning radius is only 9 ft.

## 14.


### New Water and Air Hose

The Black Wing Cord line, water and air hose, featuring a body structure based on a new manufacturing principle, has been announced by

*Welded Construction*  
**MAKES A BIG DIFFERENCE...**

**WELLMAN**

*Williams Type* **BUCKETS**



Dragline


- Wellman leads the field in welded bucket construction. Wellman improved design means better service, lower cost for you! A type for every purpose: Multiple Rope, Power Arm, Dragline, Power Wheel, Special Service; ¾ to 16½-yd. capacity.



Multiple Rope

**SEND FOR BULLETIN**

**THE WELLMAN ENGINEERING COMPANY**  
7003 CENTRAL AVENUE • CLEVELAND 4, OHIO



Power Arm

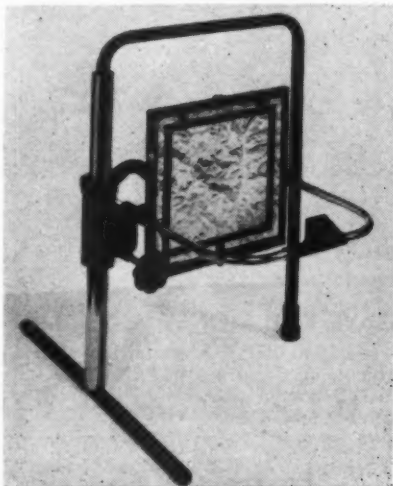


Goodyear Tire & Rubber Co. Designed to stand up under extreme "on-the-job" punishment, the water hose is expected to prove particularly adaptable for construction operations requiring a kinkless, easily-handled conduit. It is built in  $\frac{1}{4}$  in. to  $2\frac{1}{2}$  in. sizes. Also highly flexible, Black Wing air hose is manufactured in two types—2-braid standard for pneumatic tool service, and 3-braid heavy duty for air drill usage. Sizes range from  $\frac{1}{4}$  in. to  $1\frac{1}{2}$  in.

15.

### New Mapping Instrument

A new mapping instrument for rectifying and transferring planimetric detail from aerial photographs to maps and charts has been announced by the Fairchild Camera and Instrument Corporation, Jamaica, N. Y. This rectoplanigraph is a portable, light-weight instrument easily assem-



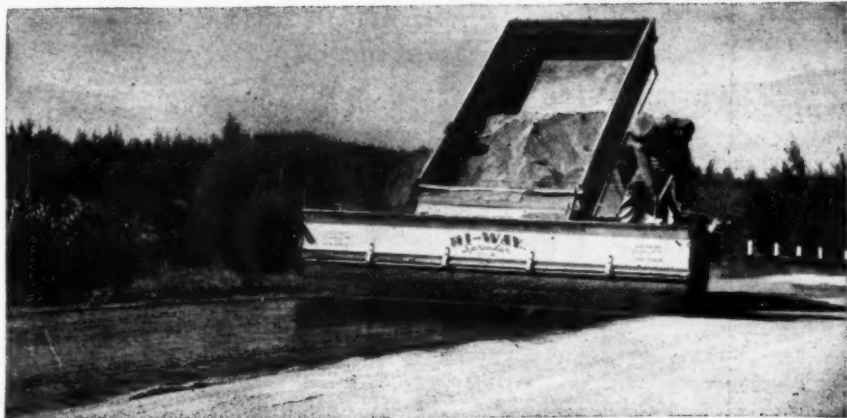
The Rectoplanigraph

bled and disassembled, and can be set on a drafting table. Its design provides indexed adjustments for three focal lengths (6,  $8\frac{1}{4}$  and 12 in.), a micrometer adjustment for all variations in scale, and other adjustments for rectification of the photographs to compensate for errors introduced by tip and tilt. A picture-holder is fitted with masks to accommodate air-photos ranging from 4 in. x 5 in. to 9 in. x 9 in. A high quality prism assures a sharp, well-illuminated image.

16.

### New Crawler Tractor

A new diesel track type tractor—HD-5—has been added to the line of Allis-Chalmers Manufacturing Co., Milwaukee, Wis. This 37 HP tractor is powered by a General Motors 2-cycle diesel engine. It has five speeds forward, ranging from 1.46 m.p.h. to 5.47 m.p.h. and a reverse



**EASIER OPERATION . . .  
FASTER.**

**MORE PROFITABLE  
SPREADING WITH HIGHWAY SPREADERS**

### The Hi-Way Model R Material Spreader with REVERSIBLE Transmission

Put more profits into your pockets by saving time and material. Shift one lever and you can operate the Model R Spreader forward or backwards to suit the job. Spiral feed roller and agitator-conveyor have reversible transmissions assuring positive action and steady flow of material regardless of direction. Feed gate adjustment controls thickness of spread. Width can be adjusted from one foot to full width of spreader. Entire unit is balanced for easy hook-up to truck. Swivel type self-coupling hitch allows traction wheels to remain in constant contact with ground...assures even distribution on any job. Hi-Way Model R Material Spreaders are available in 8, 9, 10, 11, 12, and 13 foot widths. Write for complete details.

### Spreading is a ONE MAN job with the HIGHWAY MODEL DD



This remarkable spreader clamps onto tailgate of any dump truck. Permits one man to cast a uniform spread 8 to 60 feet wide at truck speeds up to 35 miles per hour. The DD casts material close to ground under and ahead of rear wheels of truck. It is equipped with adjustable feed gates controlling thickness and direction of spread, and throttle on  $1\frac{1}{2}$  H.P. Briggs & Stratton gasoline engine to control width. Material feeds into hopper by gravity—no shoveling required. The Model DD is widely used for low cost seal coat work, for spreading

calcium chloride on gravel and dirt roads for dust control in summer, and for spreading sand and cinders on highways, streets, and airports for ice control in winter. Write for specifications.

### HIGHWAY EQUIPMENT COMPANY, INC.

605 D Avenue N. W.

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Sold and Distributed by Leading Construction Machinery  
Dealers Throughout the United States and Foreign Countries

**MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADERS**

1,280 pages of authentic,  
detailed information

# SURVEYING

Theory and Practice

By JOHN CLAYTON  
TRACY,

Professor of Civil  
Engineering

*Emeritus, Yale University*



"Surveying—Theory and Practice" is divided into four sections, furnishing a comprehensive discussion of Field Work, Office Work, Surveying Instruments, and Standard Surveys. The treatment is simple and understandable, since the book is directed to the average surveyor, rather than the specialist. Theoretical procedures of surveying are covered in detail, but in addition, the book contains thousands of practical suggestions on the subject. During the nine years devoted to the preparation of the book, the author had the cooperation of many specialists in the field and has included condensations of papers and extracts of reports and specifications by experts.

Jan. 1947    1,280 pages    \$7.50

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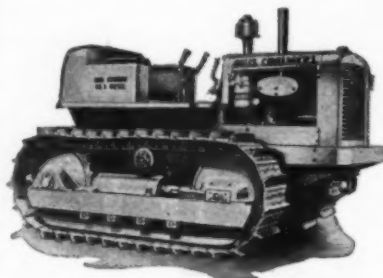
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speed of 2 m.p.h. Two different track gauges are available: a 44-in. tread (10.750 lb.) and a 60-in. tread (11.250 lb.) plus 5 ft. 4¼ in. of track on the ground. Other features of the new tractor include: grease-packed truck wheels, idlers and support rollers, serviced at the factory and thereafter requiring greasing attention only once every 1,000 hours. An A-frame



HD-5 Tractor

track stabilizer design that enables the HD-5 to absorb shock, eliminates twisting strains and provides rigid track alignment. Easy accessibility of the clutches, transmission and engine, fewer adjusting and greasing points, and longer intervals between servings are additional factors that simplify maintenance problems.

17.

## New Expansion Joint Slitter

A new, automatic unit for slitting all types of expansion joints has been announced by Keystone Asphalt Products Co., Chicago, Ill. The Keystone expansion joint slitter, driven by a 1 HP electric motor (or gasoline motor) cuts all joint materials up to



Expansion Joint Cutter

1½ in. thickness at the rate of 60 ft. per minute. The unit modern and streamlined in every way can be simply plugged in and operated by just one man. Forward and reverse operation permits cutting in both directions. It is claimed that with this unit contractors or dealers can

100%  
Self-Contained

THAT'S  
SYNTRON

Gasoline Hammer

## PAVING BREAKERS



SAVE YOU MONEY AND TIME

Use it to BUST concrete, DIG frozen ground, clay and shale, TAMP backfill, DRIVE ground rods, spikes—and a host of other jobs.

Write for illustrated folder.

SYNTRON CO.

385 Lexington, Homer City, Pa.



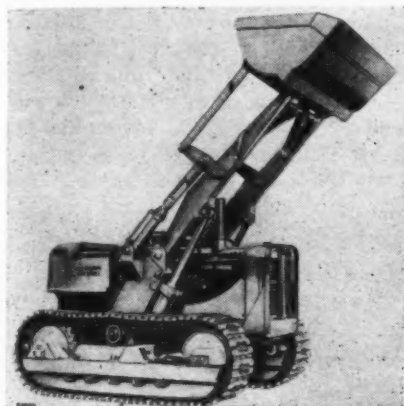


save up to 40% by carload slab type purchases and cutting their own joints to size.

18.

### New Tractor Shovel

The Model TS-5 "Tracto-Shovel," a new tractor shovel for use on the Allis-Chalmers HD-5 long track, rigid truck frame Diesel tractor, is the first in a line of tractor equipment that will be built by the Tractomotive Corporation, Findlay, O. The "Tracto-Shovel" has a hydraulically-controlled



Model TS-5 "Tracto-Shovel"

bucket operated by double-acting lift and dumping cylinders. These cylinders are designed to provide adequate down pressure and controlled dumping and closing of the bucket. The bucket can be dumped or closed at any height, quickly or slowly, and has an automatic tilt-back to prevent spillage. Tractor-width buckets of 1 cu. yd. capacity are standard equipment, with bulldozer blades or special buckets optional. The shovel frames are mounted directly to the tractor and contain a 25-gal. capacity oil reservoir. Overall length of the "Tracto-Shovel" is 14 ft. 6 in., the width is 6 ft. 3½ in., and the height, with the bucket down, is 5 ft. 11½ in.

19.

### New Relay for Traffic Control

An alternating current relay, developed by Automatic Signal Division, Eastern Industries, Inc., East Norwalk, Conn., to fill the need for a fast acting, reliable, compact relay for its vehicle-actuated traffic control systems, has been put on the market by the company. The relay is stated to stand up in these traffic control systems under duty as high as 10,000,000 operations per year. A circuit closure of as little as .010 seconds operates the relay cleanly and as many as 10

## Equalizing the Elements in CONCRETE CONSTRUCTION

### KAPCO 336 JOINT SEALING COMPOUND



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any  
Change of Weather

From experience and research has come a rubber joint sealing compound that eliminates the hazards of changing weather conditions.

All pavements require watertight, sealed joints. KAPCO 336 Joint Sealing Compound provides and maintains a perfect bond; and seals against water infiltration and pumping joints.

Even the unusual contraction of sub-zero weather, and the extreme expansion of 100° summer days will not crack or break its bonds.

KAPCO 336 is easily heated and poured mechanically or by hand.

Meets Federal Specification SS-F-336, C.A.A. Specification P-605, and all State Highway Depts. using rubber asphalt type of joint seal.

#### KEYSTONE OFFERS EQUIPMENT LINE...

Expansion joint slitting units and concrete curing compound spraying units best suited for Keystone materials are now offered to the trade. Write Keystone today for complete information and prices.

### KEYSTONE ASPHALT PRODUCTS COMPANY

A DIVISION OF AMERICAN MARIETTA COMPANY

General Offices: 43 E. Ohio St., Chicago, 11, Ill.

Mfg. Plant: Chicago Heights, Ill.

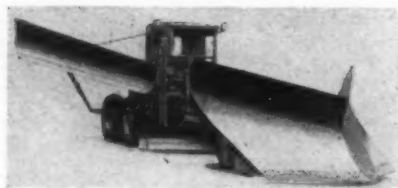


individual pairs of contacts can be accommodated on each relay. To meet the requirement of high insulation resistance, a method of individually encasing each contact spring in phenolic insulation was perfected. As a result, there is no continuous path along which current can creep inside the pileup.

## 20.

### Snow Removal Attachments

New and improved snow removal attachments are now available for the

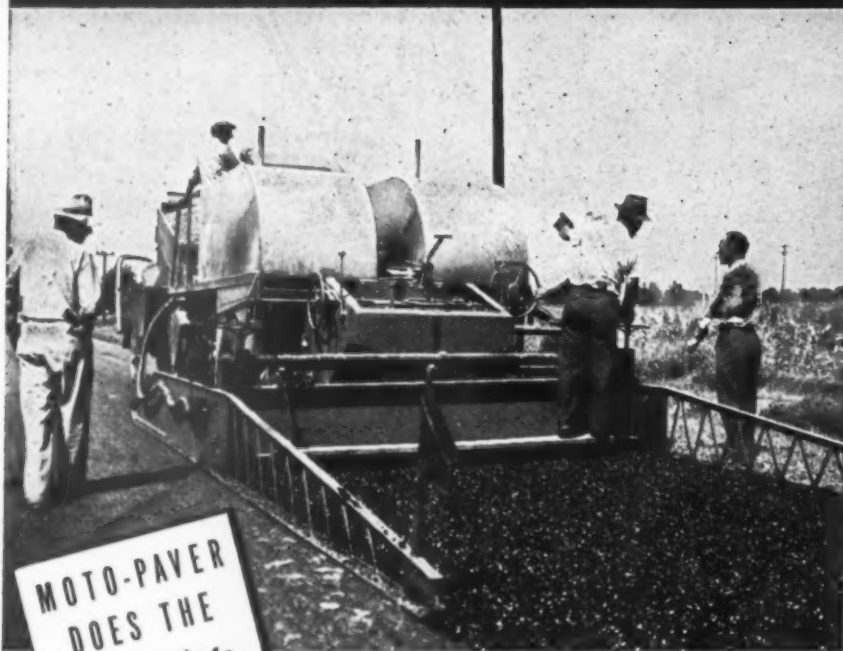


"Caterpillar" diesel motor grader equipped with "Caterpillar" V-type snow plow and mast-type snow wing

"Caterpillar" Diesel No. 212 motor grader as well as the two larger sizes of motor graders manufactured by Caterpillar Tractor Co., Peoria, Ill.

For shipment with motor graders tabbed for future delivery as well as for their graders already in operation in the field, "Caterpillar" is producing such needed attachments as the V-type snow plow, mast-type snow wing and reversible one-way plow and bulldozer. The snow wing and bulldozer are new to the "Caterpillar" Diesel No. 212 motor grader. Marked improvement in the operation of the mast-type snow wing has been effected in all sizes with modifications which insure smooth parallel lift with both ends of the blade elevated simultaneously. The mast-type snow wing for the smallest grader has a 10 ft. blade, 27 in. high with a weight of 1500 lb. The reversible one-way plow and bulldozer for the "Caterpillar" Diesel No. 212 motor grader is 8' 6" wide and 28" high, weighs 1,740 lb. and has a lift of 12 in.

## AFTER TWENTY YEARS ... A REAL IMPROVED METHOD FOR DOING MIXED-IN-PLACE WORK



MOTO-PAVER  
DOES THE  
*Complete*  
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and PAVING  
JOB

H. & B. builds portable and stationary asphalt plants of all types, sizes and capacities.

Contractors who have seen the MOTO-PAVER in action pronounce it the first real improvement in 20 years for doing mixed-in-place work. The MOTO-PAVER mixes and paves as it goes, spreading and laying any type of mixed-in-place bituminous material to any width, thickness, and crown condition. Especially adapted for resurfacing work on county roads and city streets, the MOTO-PAVER is also highly efficient on new construction. Bulletin MP-46 will be sent on request.

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**H&B Moto-Paver**  
THE COMPLETE TRAVELING MIXER AND PAVER

## MANUFACTURERS' LITERATURE

## 21.

### Welding Rods

Factual and technical data about Eutectic "low temperature" welding rods and fluxes for torch and furnaces and "Low Temperature" Eutectrodes for arc welding are given in a brochure published by Eutectic Welding Alloys Corp., New York, N. Y. The booklet gives specific applications where "Low Temperature" welding alloys can be used to good advantage, suggests which welding rod or electrode is best suited for the particular job, and lists complete technical information about the welding rod recommended, including bonding and remelting temperatures, Brinell hardness, strength, color match, etc.

## 22.

### Euclid Loader

A new catalog folder on the Euclid Loader has been issued by Euclid Road Machinery Co., Cleveland, O. This new folder features an improved model of the loader and contains more complete technical information than the catalog which it supersedes. This earth moving machine was developed by Euclid several years ago, but during the war years its use was restricted to several projects where high speed moving of large yardages was of prime importance.

23.

### Motor Grader

Construction and operational attributes of its Diesel No. 212 motor grader are outlined in a new folder of Caterpillar Tractor Co., Peoria, Ill. The illustrated folder, which includes basic specification figures, outlines the tandem or single drive facilities of the product, the leaning front wheels, the wide variety of blade positions offered, the extreme positions possible by adjustment, and the attachments available to users.

24.

### Portable Light and Power Units

Four new DA-V-LITE portable lighting and power units for 1947 are described in a booklet issued by Davey Compressor Co., Kent, O. The booklet contains complete specifications of floodlight, searchlight, combination and beacon models. In addition to their lighting uses, they can be employed to supplement existing power facilities or to provide motive power for electric tools.

25.

### Flame Cutting

Joseph T. Ryerson & Son, Inc., Chicago, Ill., steel distributors, have issued a new, illustrated bulletin on flame cutting which describes their facilities for producing plain and intricate shapes from steel plates. A number of typical flame cut sections are shown along with information regarding the use of irregular shaped steel plates in both production and maintenance work.

26.

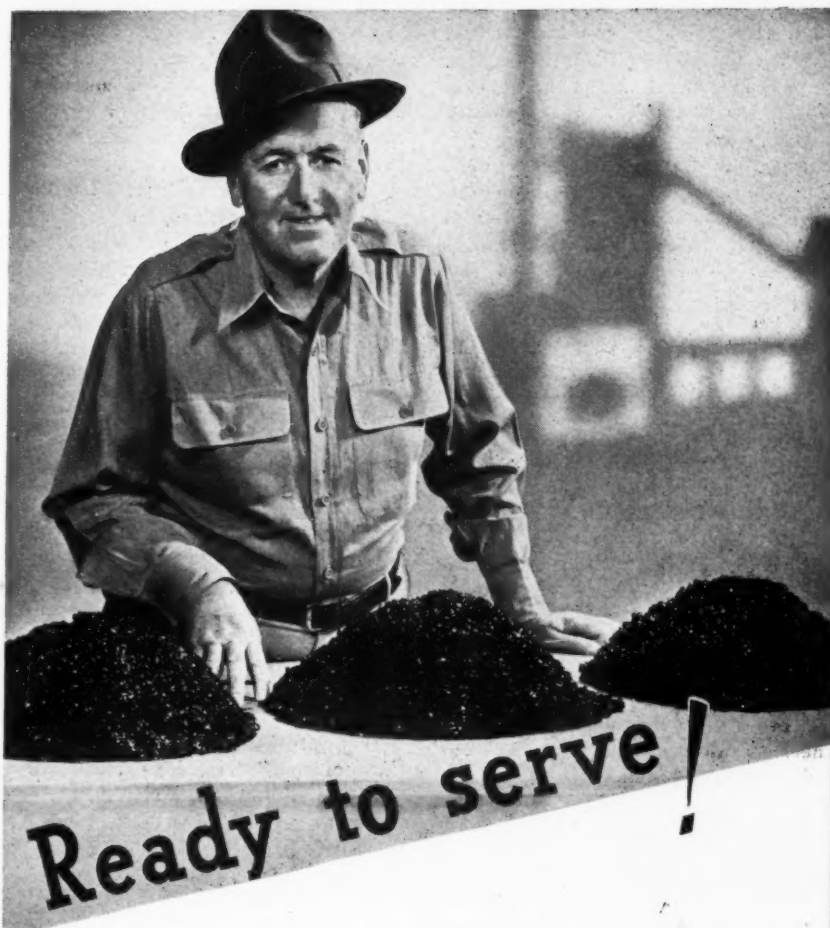
### Tournapull Applications

A new 12-page folder covering a wide range of Tournapull applications has been issued by R. G. Le Tourneau, Inc., Peoria, Ill. It tells an interesting story with action photographs and factual caption-type job descriptions. Projects covered range from general earthmoving, construction, mines, pits, quarries and railroads to applications in industrial, agricultural and oil fields.

27.

### Apron Feeders

Apron feeders for the pit, mine and quarry industries, is the subject of a new bulletin just released by Pioneer Engineering Works, Minneapolis,



**Ready to serve!**

You can't pass road mixes across the counter like sugar or salt, but certain unique features of KOTAL MASTER MIXES make it possible to handle them almost as easily as that.

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Let us tell you more about this important scientific development in the art of road building and maintenance. We'll gladly send free booklet to you—also the name of your nearest supplier.



## KOTAL COMPANY

360 Springfield Ave. ★ Summit, N. J.

# KOTAL Master Mixes

The Advanced All-Weather Aid in Building Better Roads



Minn. Designed to present factual information, the new bulletin contains complete specifications on 69 various models, types and sizes of standard Pioneer feeders available. Besides describing the feeders in detail, data are given on capacities, dimensions, weights, and horse-power. Of special interest is information on how to order to insure the right feeder for the job.

28.

### Machinery Trailers

An extensive line of construction equipment trailers are illustrated and assembled in a catalog of The Winter Weiss Co., Denver, Colo. The line includes 20 to 60-ton semi-trailers with bogie axles, 20 to 60-ton full trailers with tandem bogie axles, 20-ton semi-trailers with 8 dual tires in line, 10 to 15-ton low bed springless full trailers and 10 to 60-ton low bed trailers. Included also are 2-wheel tilt bed trailers and 1½ to 2-ton wheel trailers. Specifications for each type are given.

29.

### Snow Removal Attachments

Attachments which convert motor graders into snow removal units are highlighted in a new folder released

by Caterpillar Tractor Co., Peoria, Ill. The folder focuses attention on the "Caterpillar" V-type snow plow, mast-type snow wing and reversible one-way plow and bulldozer again in production for exclusive use with the "Caterpillar" Diesel No. 12 and No. 112 motor graders and manufactured for the first time, in proportionate size, for the "Caterpillar" Diesel No. 212 motor grader. Basic specifications are given and principal features of the attachments are treated editorially and pictorially.

30.

### Planning Small Bridges

A new booklet, "Planning Small Bridges with Toncan Iron Drainage Products," has been published recently by Toncan Culvert Manufacturers Association, Cleveland, O. The booklet contains detailed charts and tables of the dimensions and design properties of Toncan iron sectional plate and sectional plate arches, and numerous illustrations and descriptions of applications of Toncan products to small bridge design.

31.

### Babbitt and Bearing Metals

The complete range of "NBM" bab-

bitt metals and "tiger" bronze cored and solid bars is covered in a comprehensive catalog published by American Brake Shoe Co. Recommended applications are given for the eight leading brands of "NBM" babbitt metals together with details of their physical properties and instructions for rebabbiting. One thousand standard stock sizes of "NBM" bronze cored and solid bars for bushings and bearings are listed as well as examples of typical special castings-produced of "NBM" bronzes in a variety of shapes, sizes and alloys.

32.

### Scrapers

Specifications and production features of the new "Caterpillar" scrapers are stressed in a broadside published by Caterpillar Tractor Co., Peoria, Ill. The scrapers are matched in capacity to the power of the manufacturer's Diesel-powered tractors and built to perform with them as a complete earthmoving package.

33.

### Preformed Wire Rope

Last summer the Preformed Wire Rope Information Bureau sent out a questionnaire to wire rope users ask-

**Save the moisture and you save the tree!**



# DOWAX

Dowax reduces mortality, promotes growth and extends the transplanting season of trees and shrubs. It is an emulsified paraffin wax containing bentonite which prevents the wax from melting or penetrating plant tissue and permits it to dry with a certain porosity so the plant can breathe. Dowax, mixed with water, is sprayed on before, during, or immediately after transplanting. Water evaporation is reduced to a minimum and this conserved moisture is tremendously helpful while the plant is reestablishing itself.

On established evergreens, winter browning due to water evaporation can be prevented by an application

of Dowax during the dormant stage. This reduces moisture loss and keeps trees green all winter. Dowax is also valuable to replace paper wrappings to discourage borer attack on trunks of most transplanted trees. It reduces needle fall on Christmas trees, reduces wilting in many cut flowers, and reduces moisture loss in bulbs in storage—particularly dahlia, canna, and gladiolus. Available in 200 pound drums and in 1, 5 and 10 gallon cans.

**Extend the transplant season!**  
**—Reduce losses!**

AGRICULTURAL CHEMICAL DIVISION

**THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN**  
New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis  
Houston • San Francisco • Los Angeles • Seattle  
Dow Chemical of Canada, Limited, Toronto, Ontario





ing them what they thought of preformed wire rope. A total of 8,339 replies was received. The results of this survey have been condensed and charted in a booklet just issued by the Bureau. Ten questions were asked relative to the use, performance and value of preformed wire rope. The answers received to the questions were most informative.

34.

### Welding and Cutting Products

A new 64 page general welding and cutting products catalog has been issued by Air Reduction Sales Co., New York, N. Y. Profusely illustrated, this catalog is divided into two sections: one for oxyacetylene welding and cutting gases, equipment and supplies; the other for arc welding machines, accessories and electrodes. The last 10 pages of the catalog are devoted to specially compiled electrode price lists.

35.

### Chain Hoists

Their complete line of spur geared

high-speed) and differential chain hoists, together with their army type low headroom Timken equipped trolley hoists, are covered in a 16-page 8½x11 bulletin issued by Chester Hoist Co., Lisbon, O. The bulletin contains tables, section and photographic views of the various products, including a complete line of I-beam trolleys.

36.

### Tandem Rollers

A new 12-page catalog on their line of variable weight tandem rollers has been issued by Galion Iron Works & Mfg. Co., Galion, O. The variable weight of these rollers makes available a range of roll compressions from 120 lb. per inch of roll face in the lightest model to 315 lb. per inch of roll face maximum compression of heaviest model when fully ballasted and with fuel and sprinkler tanks full. In addition to detailed construction views and data, complete specifications are given in the catalog.

## WITH THE MANUFACTURERS & DISTRIBUTORS

### New Distributors for Gradall

The appointment of four additional distributors for Gradall, multi-purpose earth mover being manufactured by The Warner & Swasey Company, Cleveland, O. has been announced by S. F. Beatty, Jr., assistant sales manager of the company in charge of the Gradall Division. McClung-Logan Co. of Baltimore, will distribute the machine in Maryland and southern Delaware. Service Supply Co., Philadelphia, will handle sales in eastern Pennsylvania, southern New Jersey and northern Delaware. Manwaring Machinery Co., Indianapolis, will distribute Gradall in central and southern Indiana. Golden State Equipment Co. in Los Angeles, will service southern California and four bordering counties in Nevada.

HERE'S ONE

NEW POST-WAR PUMP

THAT'S READY FOR DELIVERY

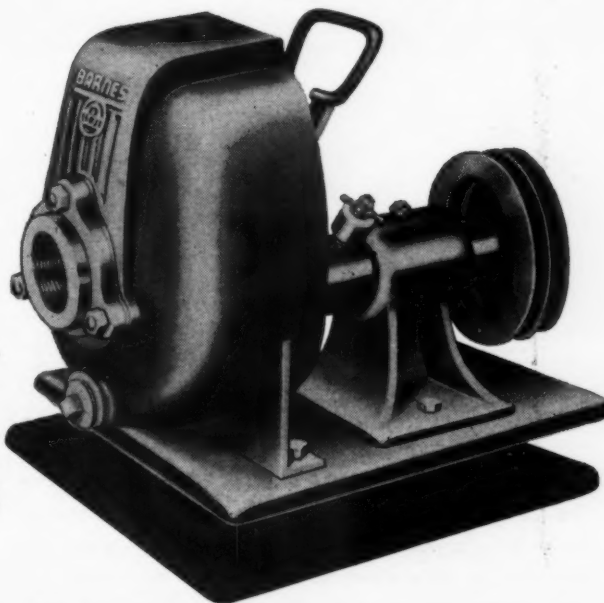
Now!

### Barnes' NEW UNIVERSAL DRIVE 1½-inch Automatic Centrifugal Pump

TIRE of waiting for "post-war marvels"? There's no need now to wait longer if the marvel you want is an economical, dependable pump adaptable to any power source.

The brand-new Barnes 3MU Pump is slick as a whistle and is as handy as the pocket in a shirt for contractors, industrial plants, municipalities, farmers and gardeners or wherever the operator's own power source is available. It will deliver top performance when belt driven or operated directly from shaft coupling. It delivers up to 5700 gallons an hour with pressures up to 35 pounds per square inch. This new Centrifugal Pump has the same Automatic Prime, Barnes Super-seal, Direct Flow Suction, Non-Clogging Impeller and all other fine features found in Barnes' famous "33,000 for 1" Pumps.

These advantages plus easy portability (35 lbs.) open hundreds of new uses for these rugged, economical and dependable Centrifugal Pumps. They are ready for delivery now. Order one or 100 today.



**BARNES MANUFACTURING CO.**

*Quality Pump Manufacturers for 50 Years*

MANSFIELD, OHIO

When writing advertisers please mention —> ROADS AND STREETS, January, 1947

121

When it's **BALANCE** that's needed...

LOOK TO LA CROSSE FOR:

Flexible, All Welded Construction

Extremely Low Center of Gravity

Even Distribution of Trailer Strength

Smooth Stopping: Air or Vacuum Brakes

Write for the name of your nearest dealer



**LA CROSSE**  
TRAILER CORPORATION

LA CROSSE  
WISCONSIN



### New Le Roi Distributor

George Malvese and Company, Jericho Turnpike, New Hyde Park, Long Island, N. Y. has been appointed by Le Roi Co., Milwaukee, Wis. as their exclusive distributor for the New York counties of Kings, Nassau, Queens, and Suffolk. George Malvese and Company, a partnership, has been in business in this area since 1921, and will represent Le Roi for their portable Airmaster compressors and Tractair.

### Thornton Tandem Changes Name

The Thornton Tandem Co., Detroit, Mich., one of the largest manufacturers of special truck equipment, has discontinued that name and now is operating as Detroit Automotive Products Corporation. Announcement of the new company name came from F. D. Knoblock, president. He explained that the former name was appropriate when the Thornton tandem drive was the only product manu-

factured by the company, but the addition of new products called for a name more accurately describing the business. There has been no change in management, personal or corporate structure. Other officers and executives are A. F. Knoblock, chairman of the board; S. F. Baker, vice president; R. F. Barnum, secretary-treasurer, and Ivan Graham, sales manager. Detroit Automotive Products Corporation has done extensive experimental work on other new products, and the company now is tooling up for production of

**ETNYRE**

"Black-Topper"

BITUMINOUS DISTRIBUTORS



**ACCURATE...DEPENDABLE...ECONOMICAL—**

Do the job faster and save time, labor, and material with an Etnyre "Black-Topper." Over 40 years of research, quality construction methods and materials insure accurate, dependable performance. See your Etnyre dealer or write direct.

**E. D. ETNYRE & CO., Oregon, Illinois**

DOES the JOB  
**FASTER—**  
**MICHIGAN**  
Mobile SHOVEL  
MODEL T-6-K



FINGERTIP  
AIR CONTROLS  
•  
¾ YARD  
SHOVEL  
•  
6 TON CRANE

**MICHIGAN**  
POWER SHOVEL CO.  
BENTON HARBOR, MICHIGAN



another new item. Additional truck equipment items will be added to the line as manufacturing facilities are expanded.

### Appointments by Detroit Diesel

Appointment of John C. Campbell as manager of industrial engine sales and of James W. Brown as advertising manager has been announced by V. C. Genn, General Sales Manager for the Detroit Diesel Engine Division of General Motors. Mr. Campbell, following his graduation from the University of Detroit with an engineering degree, spent several years with the Wright Austin Co. and with the Frigidaire Division of General Motors. He joined Detroit Diesel in 1942 as a member of the sales depart-



J. C. Campbell



J. W. Brown

ment studying the wide uses of the GM Series 71 engine in industrial applications. Since 1945, Mr. Campbell has been in charge of advertising and sales promotion activities for the company. Mr. Brown, who now takes over as advertising manager, has been directly connected with advertising and publication work since his graduation from Yale in 1927. He spent several years on the advertising staffs of leading publications in Cleveland, Memphis, and Dallas, and for the past year has held the position of Product News manager for Detroit Diesel. Mr. Brown, who is well known as the author of "What Do GM Diesels Do?", will continue to be in charge of Product News for the company.

### Pittsburgh Steel Sales Changes

Pittsburgh Steel Co. has announced changes in its general sales organization effective Jan. 1, 1947. Carl L. Zak, formerly assistant sales manager since April 1945, was appointed general manager of sales. Other changes in the sales organization include the appointment of L. A. Ver Bryck as assistant general manager of sales. Mr. Ver Bryck's appointment involves his withdrawal from the company's New York office where

**Want MORE  
OUTPUT?**

**With LESS  
LABOR?**

**Solve Your DIGGING and  
MATERIAL HANDLING Jobs  
with 1 MAN and a  
SAUERMAN  
Scraper or Cableway**

With one man at the controls, a Sauerman Power Scraper or Slack-line Cableway digs, hauls, and automatically dumps sand, gravel, earth or bulk material. Simple operation! Small expenditure of power! A Sauerman machine can be installed to reach across a pit, pond, river or stockpile, or up to the top of a hill. It moves material at high speed, anywhere within its wide radius. Flexible for any conditions.

Choice of handling capacities is available from 10 to 600 cu. yds. per hour. Gas, electric or diesel power.

Send for useful information book based on data supplied by contractors, engineers, gravel producers, mine operators, etc. It's free.

**SAUERMAN BROS., INC.**

588 S. Clinton St., Chicago 7, Ill.

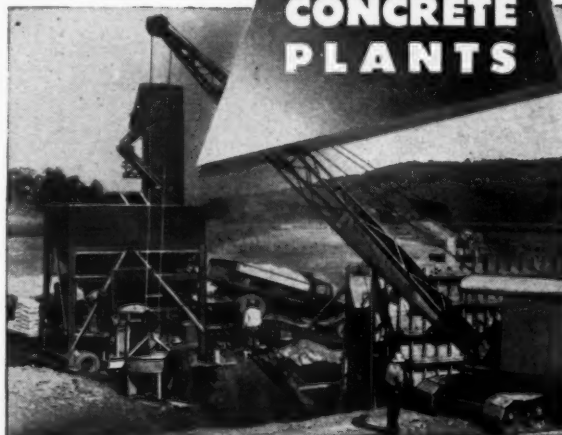


Small Sauerman Scraper  
Feeds Screening plant

Above picture shows a typical Sauerman job—1-Man Scraper drags gravel from hill at cost of few cents a yard.

### 1 - CONTRACT 8 - JOBS 11,000 Cu. Yards of Concrete 115 Moves

A 3/4 yd. Strayer Portable Concrete Plant averaged 24 cu. yards an hour under severe conditions, pouring 150 batches in one 5 hour period and paid for itself several times over. That was before the war—today's Strayer plant is easier and faster in operation thanks to fingertip hydraulic controls on all gates and many other design refinements.



*Write* today for complete data on the Strayer Portable Concrete Plant that combines vertical conveyor to 3 compartment 20 cu. yd. Bin Storage—Weighing AggreMeter—Cement Pre-mixing—Accurate Water Control—Engine Drive. All mounted on 8-Wheeled chassis permitting moving from job to job.

**STRAYER Portable CONCRETE PLANTS**

*Eric Steel Construction Co., 368 Gelst Rd., Erie, Pa.*

BUCKETS • AGGREGATES • PORTABLE CONCRETE PLANTS





## FASTER LOADING, LIFTING, SCRAPING

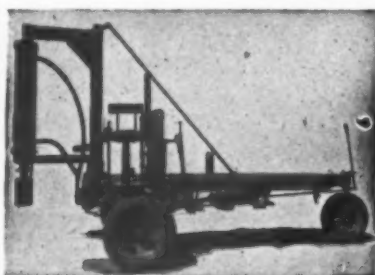


"The Ottawa" INDUSTRIAL Hydraulic Front-End Loader saves hundreds of man hours on every job. A rugged heavy duty attachment for industrial type tractors that loads bulk materials, does light bulldozing jobs and operates as a portable crane. A year round labor saver—will do hundreds of odd jobs better faster. Bulldozer, Boom and Snow Plow attachments available to give you maximum productive use of your industrial tractor.

Fits most models of industrial tractors. Write today for prices and illustrated bulletin. IMMEDIATE SHIPMENT.

**OTTAWA STEEL PRODUCTS, INC.**  
OTTAWA, KANSAS

## RAPID!



Cuts concrete and cuts labor costs to 2 1/2¢ per square yard. Applicable to floor work and different types of inside horizontal work.

Very efficient in maintenance work of highways.

Boom folds down and readily trailed by any light truck. Make your compressor treble its output by hooking it to this machine.

**Rapid Pavement Breaker Co.**

1517 Santa Fe Ave.  
Los Angeles 21, Calif.

## Shunk Snow Plow and Ice Removal BLADES

Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

FOR ALL TYPES AND MODELS OF SNOW PLOWS  
Various widths, lengths, thicknesses—flat or curved—standard or special—punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE  
Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.



**Shunk**

**MANUFACTURING COMPANY**

ESTABLISHED 1854  
BUCYRUS, OHIO

he served as district sales manager. Succeeding Ver Bryck as New York district manager of sales is Joseph G. Smith who has been manager of Pittsburgh district sales until this new appointment. Walter D. Schlundt, former district sales manager at Detroit, will replace Mr. Smith as district sales manager at Pittsburgh. Named as assistant district sales manager in the home office is Robert W. Mullin. Edward L. Dull becomes district sales manager at Detroit. He had previously been connected with Pittsburgh Steel Co.'s Chicago office.

## Establishes FWD Western Sales Headquarters

Four Wheel Drive Auto Co. truck sales headquarters for the states of California, Nevada, Arizona, Utah, New Mexico, Colorado, Wyoming, Montana, Idaho, Oregon and Washington



P. M. Schmidt

have been established at the New-hause Building, Salt Lake City, Utah, according to an announcement by P. M. Schmidt, western states sales zone manager. FWD district sales supervisors in this zone are J. E. Battes in northern California and the state of Nevada, and A. M. Dahm in Wyoming, Colorado and New Mexico. Other FWD sales representatives in the western states are M. M. Gavin for the southern part of Idaho and the state of Utah; H. W. Collard, Oregon; R. S. Reeves, Washington and northern Idaho; C. H. Gaither in the Los Angeles territory; J. J. Horner, southern California. W. S. Brooks is manager at the FWD Los Angeles Branch which territory includes southern California and the state of Arizona. Orville Johnson is utility specialist.

## Beckwith Elected President

George N. Beckwith, heretofore vice president and general manager of Beckwith Machinery Co., Pittsburgh, Pa., has been made president. J. S. Beckwith, former president, was named executive vice president, Edward G. Stoner retains the position of vice president.

George N. Beckwith entered the construction equipment business 16 years ago in the Service and Parts Department of Beckwith Machinery

## small **ROGERS TRAILERS** too... embody



**EXPERIENCE** builds 'em  
**PERFORMANCE** sells 'em

Rogers' time proven features of fundamental design which have been tested under all kinds of severe conditions.

In any Rogers Trailer the purchaser obtains the maximum in construction features, in ease of handling, in safety and all round operation

**ROGERS BROTHERS CORPORATION**  
110 ORCHARD ST., ALBION, PA.

Co., following which he became a salesman in the field. He subsequently served as manager of the Pittsburgh plant and then general manager of all four Beckwith branches.

### Additions to Sales Staff

W. H. Hammond, vice-president in charge of sales of Gar Wood Industries, Inc., has announced two additions to his staff: Robert F. Whitworth as division sales coordinator, and George W. Murphy as branch sales coordinator. Mr. Whitworth, as a colonel in the Army, supervised the procurement, production and inspection of more than 1,250,000 vehicles for the Detroit Ordnance District. Prior to entering the Army, he had been associated with Great Lakes Steel Corp. Mr. Murphy, who served as a major in the Marines, was formerly general sales manager for cereals of the Albers Milling division of the Carnation Co.

### New Davey Distributor

Broome Truck & Equipment Co., 340 E. Main St., Endwell, N. Y., has been appointed to a full dealership for Davey Compressor Co., Kent, O. Territory covered includes the New York

counties of Broome, Chenango, Delaware, Tioga, Tompkins, Chemung, Schuyler, Cortland and Yates.

### Appointed FWD Zone Sales Managers

The Four Wheel Drive Auto Co., Clintonville, Wis. has appointed Wm. C. Merrill as Manager of FWD sales in Zone 3, and A. R. Krug as Manager of sales in Zone 6. Mr. Merrill's zone covers the states of Texas, Oklahoma, Arkansas, Louisiana and Mis-



A. R. Krug



Wm. C. Merrill

issippi. Mr. Merrill has been district sales supervisor in this territory, with headquarters at Duncan, Oklahoma. FWD sales representative for the states of Texas and Oklahoma is J. R. Horton and for Arkansas, Missis-

sippi, and Louisiana, A. E. Roemer. Mr. Krug's zone covers the states of Tennessee, Alabama, Florida, Georgia, South Carolina and North Carolina. Mr. Krug was formerly assistant sales promotion manager at FWD. FWD sales representative for the states of Florida and Georgia is R. H. Bohon; for Tennessee and Alabama, R. D. Morriss; for North Carolina and South Carolina, W. W. Caughman.

### Named District Manager

Russell D. Hiller, Jr., has been named district manager—general line, for Gar Wood Industries, Inc., with headquarters in Tulsa, Okla. His territory embraces Texas, Oklahoma, and Louisiana. Before joining Gar Wood, Mr. Hiller was associated with Air Reduction Sales Co. in Tulsa.

### Appointed Purchasing Agent

Clarence G. Roll has been appointed purchasing agent of the Ashland, Kentucky, Division of The American Rolling Mill Co. He succeeds C. J. Moegling, who recently died after 23 years as the division's purchasing agent.



Exclusive features, expert design and superior construction characterize Owen buckets. Long life with dependable service has resulted wherever Owens have been put to work.

The latest catalog is now available. You'll doubtless want to look it over, keeping your current excavating, material handling and dredging equipment demands in mind. Write for the catalog TODAY.

**The OWEN BUCKET Co.**  
8670 Breakwater Avenue Cleveland, Ohio  
Branches: New York Philadelphia Chicago Berkeley, Cal.





*Try a Pierce-Bear on that tough job!*

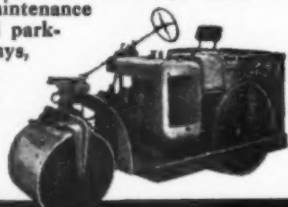


### 3½ TON — VARIABLE WEIGHTS

Engineered refinements and rugged strength have earned for these rollers enviable performance records. Compact design gives efficient operation in close quarters. Ideal for maintenance work on highways, airports and parking areas. Fine for driveways, docks, etc. Easy to operate. They do a good job at low cost.

Write for New Illustrated Folder.

MANUFACTURED BY



**Lewis Manufacturing Co.**

SAN ANTONIO 6, TEXAS

P. O. BOX 500



½ Cu. Yd.

8' Lift

### FRONT END LOADERS

for Industrial Tractors

Write for Catalog

Elkhart

**White Mfg. Co.**

Indiana

### J. S. Young New Chairman PCA

Joseph Samuel Young, of Allentown, Pa., president of the Lehigh Portland Cement Co., was selected chairman of the board of directors of the Portland Cement Association at its recent annual meeting in Chicago. He succeeds M.



J. S. Young

Moss Alexander of St. Louis, president of the Missouri Portland Cement Co., who has been chairman of the board for the past two years.

Mr. Young, long prominent in business and civic affairs, was chairman of the War Production Board for the central eastern section of Pennsylvania, during World War II and was also a member of the Cement Industry Advisory Committee of the War Production Board.

During World War I, Mr. Young served for two years as instructor in the Machine Gun Officers' Training School, at Camp Hancock, Ga. He was graduated from Princeton Uni-

versity in 1920 with an A. B. degree and entered Columbia Law School from which he received an L.L.B. degree in 1923.

Mr. Young entered the service of the Lehigh Portland Cement Co. in 1923, and in 1925 was elected vice-president and assistant to the president, Col. Edward Mark Young, his father. He became a director of the company in 1931. Following his father's death, Mr. Joseph S. Young, was elected president of the company on May 16, 1932, in which capacity he has served continuously since.

### Drott Moves Into New Quarters

Completion of new modern office and manufacturing buildings at 4344 North Green Bay Ave., has been announced by E. A. Drott, President, Drott Manufacturing Corporation, Milwaukee 1, Wis. Expansion from midwest to national distribution in recent years and addition of new products to its line created a need for greater production facilities. Officers of the corporation, in addition to President E. A. Drott, are F. Frantz, Vice President; Ed. Drott, Jr., Treasurer and Chief Engineer; John Drott, Secretary and Sales Manager.

### St. Paul Hoist Now Gar Wood Division

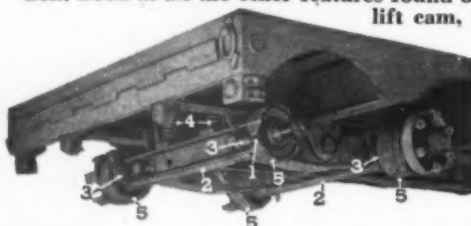
For the past several years, St. Paul Hydraulic Hoist Co., Minneapolis, Minn., has been a subsidiary of Gar Wood Industries, Inc. of Detroit, Mich. To make the fullest use of the facilities and personnel of the two organizations, St. Paul Hydraulic Hoist Co., has become an operating division of Gar Wood Industries, Inc. as of Nov. 1, 1946. Hereafter, the Minneapolis plant will be known as the St. Paul Hydraulic Hoist Division of Gar Wood Industries, Inc.

### Appointed Sales Agent for Sealz

Appointment of Lynn W. Young as mid-west district sales representative for Sealz, highway joint sealing compound, has been announced by Samuel P. Tauber, sales agent for this product of Naugatuck Chemical division of United States Rubber Co. His territory includes Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, Minnesota, Iowa, Missouri, Wisconsin, Illinois, Indiana, Michigan and Kentucky. He is mak-

### BE SURE YOUR NEXT TRAILER HAS ALL THESE FEATURES

● Deep, wide flange main beams running the full length of the trailer, I-Beam sections for cross-members and outriggers, improved, fabricated gooseneck, and all electric-welded construction. Look at all the other features found only on Jahn tandem axles: (1) constant lift cam, (2) two full-width axles attached to longitudinal rocker beams, (3) worm gear type slack adjusters at each wheel, (4) heavy coil springs at each axle and (5) positive equalizing braking at each wheel regardless of position of axle.



**C. R. JAHN COMPANY**

1345 W. 37th PLACE, CHICAGO 9, ILL.

Heavy duty trailers from 5 to 100 tons.





## CONTRACTORS RUBBER PRODUCTS

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for immediate Delivery

CONVEYOR, ELEVATOR and  
TRANSMISSION BELTING  
all widths and piles

V-BELTS all sizes

### HOSE

all sizes and types

AIR	DISCHARGE	STEAM
FUEL	COMPRESSOR	VACUUM
FIRE	PILE DRIVERS	SUCTION
WATER	ROAD BUILDERS	WELDING

BOOTS, DREDGE SLEEVES,  
PUMP DIAPHRAGMS, ETC.

... and everything rubber  
for Industrial Requirements

Write for new catalog

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**CARLYLE RUBBER**  
**CO., Inc.**

62-66 PARK PLACE NEW YORK 7, N. Y.  
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## DAY AND NIGHT SAFETY SIGNS

*Now Available!*

Cataphote Metal Signs for all traffic control requirements now available! These signs and markers equipped for 24-hour-a-day duty with famous Cataphote Reflector Buttons. Used coast to coast for safer highways.

Outstanding in appearance and legibility. Specify Cataphote when ordering from your dealer. Write.

**CATAPHOTE CORP.**  
Toledo, Ohio



Unretouched photograph of Pennsylvania Turnpike with Cataphote Niteway Outliner installation.



ing his headquarters at 4804 Jefferson St., Kansas City, Mo.

### Elected Vice President CF & I

A. F. Franz, Pueblo, Colo. has been elected vice president in charge of operations for The Colorado Fuel & Iron Corporation, succeeding Robert T. Dunlap, resigned. Mr. Franz is a native of Cleveland, O. Before coming to the Wickwire Spencer Steel Division of the Corporation at Buffalo, N.Y., as general superintendent of the Buffalo plant, he was associated with The Allan Wood Steel Co. of Conshohocken, Penn. Mr. Franz was appointed works manager of the Colorado Division last March. In his new position he will have complete charge of all operations of the corporation.

### Appointed Sales Manager

Effective as of Nov. 1, 1946, L. J. Renner has been appointed Mid - Continent Wire Rope Sales manager for the Wickwire Spencer Steel Division of The Colorado fuel and Iron Corporation. Mr.



L. J. Renner

Renner will be located at 1502 Fort Worth National Bank Bldg., Fort Worth 2, Tex. His appointment will facilitate the service rendered to the users of Wickwire Spencer Wire Rope throughout the mid-continent area. He previously handled the sale of wire rope in the Chicago district office.

### A. C. Walsh Retires

After 26 years of service, Albert C. Walsh, purchasing agent, Timken Roller Bearing Co., Canton, O., has retired. Mr. Walsh, joined the Timken firm when it purchased the assets of the Gilliam Manufacturing Co., with whom Walsh was then employed.

### Elected Armco Vice Presidents

R. C. Todd, G. F. Ahlbrandt and Dr. Anson Hayes have been elected vice presidents of The American Rolling Mill Co. For many years, all three men have held key positions in the company and have contributed to the organization's growth and progress.

## American Association of State Highway Officials POLICIES AVAILABLE

You may now obtain the full set of Seven Association Policies at Group price of \$2.25.

Highway Classification .....	\$.50	Set of 7 at \$2.25
Rotary Intersections .....	.50	
Sight Distances for Highways .....	.50	
Intersections at Grade .....	.50	
Highway Types (Geometric) ..	.50	
Criteria for Marking and Signing No-Passing Zones on Two- and Three-Lane Roads .....	.50	
Grade Separations for Intersecting Highways .....	1.00	

These are the policies referred to in the recently adopted Association standards for secondary and feeder roads, and roads on the national system of interstate highways.

Order Direct from

**AMERICAN ASSOCIATION OF  
STATE HIGHWAY OFFICIALS**

1220 Nat. Press Bldg., Washington 4, D. C.

## SAVE \$ and INCREASE TRACTOR POWER

The Bulldozer Blade Nu-Edge Bar is butt-welded to new or worn blade and welding bead covered with a thin layer of hard-surfacing electrode—Affording 2,000% savings in blade replacements.



**BULLDOZER TRACTOR GRIP-LUGS** are easily welded to any size grouser shoe without dismantling assembly. Made of special work-hardening steel which becomes tougher with use — outwearing original grouser.

See Your Local Dealer  
Send for Folder RS Today.

**SOLE PRODUCERS  
ALLIED STEEL PRODUCTS, INC.**  
7835 BROADWAY • CLEVELAND 5, OHIO

# CLEARING HOUSE

## AVAILABLE NOW LEASE OR RENTAL ONLY

- 2 New Truck-Cranes—Boom to 110 feet.
- 2 Super C Tournapulls.

### FOR SALE

- 3 Model D. Tournapulls.
- 1 DD Cletrac Bulldozer.
- 1 Insley 3/4 Yd. Combination Crane-Shovel.

WILL TAKE YARDAGE CONTRACTS ANYWHERE.

Box 100  
Roads & Streets  
22 West Maple St. Chicago 10, Ill.

## WANT TO BUY

2 — 25 to 50 - TON CAP.  
PORTABLE CRUSHING  
PLANTS COMPLETE —  
GAS OR DIESEL.

## THE DARIEN CORP.

DARIEN

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## FOR SALE

- 4—Rebuilt Cat. DW10 Tractors with Cat. W-10 Bottom Dump Wagons and Athey PD10 Side Dump Trailers.
- 5—Rebuilt Cat. DW10 Tractors with LaPlant Choate CW10 Scrapers.
- 3—Practically New—Cat. DW10 Tractors with LaPlant Choate CW10 Scrapers in use only 3 months.
- 4—Hug Trucks Model 87Q powered by Cat. D468 Diesel Engine with 6 Yd. Rock Dump Bodies—Fine Shape.

John Fabick Tractor Co.

3100 Gravois Ave.  
St. Louis, Mo.

## FOR SALE

Model WK Allis-Chalmers Tractor with 18" grousers. Serial 6283; also Baker bulldozer with hydraulic pump unit for operating dozer and Baker Model 180-103 5-yd. hydraulic scraper. Equipment completely overhauled. Reason for sale: Equipment too small for our work. Wolf Construction Co., 611 West Market Street, Logansport, Indiana.

## FOR SALE

- 1—Foote Paver .....\$3,000.00
- 1—Huber Roller, Gas, 10-ton  
—3-wheel ..... 1,250.00
- 3—Steam Tandem Rollers (Prices vary)
- 1—Barber-Greene Ditcher ... 2,500.00
- 2—Drott Universal Bull Clam  
Shovels (New), each .... 500.00
- 1—Buckeye Sub Grader, 10'  
to 12' ..... 3,250.00
- 1—Iroquois Asphalt Plant  
2,000 lb. box .....15,000.00

PHIL H. McQUIRE

P. O. Box 34, Norfolk, Va.

## FOR SALE:

- 1—Cletrac Model 35 Crawler Tractor—Gas. Hercules Motor—Operating condition, but needs new rollers and track frame repaired. Tracks in good shape. Price \$750.00.
- 1—Austin Western 35 Pull Grader—8' blade. Pair shape—ready to operate. Price \$300.00.

CITY OF SPARTA, WISC.

G. O. Bergman, City Engr.

## TRANSITS and LEVELS

New or Rebuilt  
Sale or Rent

Headquarters for REPAIRS—any make. Factory service. We will also buy your old instruments or take them in trade.

A complete line of engineering Instruments and Equipment for Field or Office. Write for Bulletin RS-112.

WARREN-KNIGHT CO.

Manufacturers of Sterling Transits and Levels  
136 N. 12th St. Philadelphia 7, Penna.

## FOR SALE

CLIMAX GASOLINE  
ENGINES

NEW — model V-425, 12 cylinder 425 H.P. at 1200 RPM, gasoline engine power unit complete radiator to twin disc clutch inclusive with gasoline starting engine. Cheaply convertible to natural gas operation. Priced far below factory list, 7 units available. Dealers invited.

THE FINN EQUIPMENT  
COMPANY

2525 Duck Creek Road  
Cincinnati 8, Ohio  
Phone East 1125

## NEW EQUIPMENT — IN STOCK FOR IMMEDIATE SHIPMENT

New "CONTINENTAL" Engines, complete with Clutch. 8 to 40 h.p. Also, complete stock parts.  
New "LULL" SHOVEL-loader, Hydraulic controlled, 1/2-yard bucket, 8'-6" dumping hgt. on "M-M" model RTI Industrial tractor, pneumatic tires.  
New "JOHNSON" Batching Bin for 34-E Paver. This is the new Twin-Batcher, 3 comp., 100 yards, 150 ton.  
New "RAPID" Pavement breaker, Junior model, pneu. tires. (Takes 210 ft. Air Compressor.)  
New "LITTLEFORD" Tar and Asphalt Kettles, 165 gallon with gas engine & power spray, pneu. tires.  
New "HUBER" Tandem patch roller, 3 to 4 ton.  
New "HUBER" Maintainer, with 8' blade and FRONT-END LOADER.  
New "FARQUAR" Car Unloaders, Gas engine driven.  
New "WHITEMAN" Floor Finishers and Blades.  
New "JAEGER" Pumps, all sizes. Also, New Suction Hose, TARPAULINS, HOT WATER HEATERS, CONCRETE MIXER HEATERS, MORTAR BOXES, THAWING TORCHES, "CLEVELAND" AIR TOOLS, MOIL POINTS, CHISELS, MASONRY SAWS, BLADES, VIBRATORS.

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Used Batching Bin, "BLAW-KNOX", 110-ton, 3 comp., nearly new, used on one small job.  
Used Car Unloaders, "PORTABLE-FARQUAR" Gas engine driven.  
Used Pile Driving outfit, consisting of "THEW" Steam Crane, 40 boom, steel leads, and choice of "VULCAN" #2, McK-T #5 or #7 hammers.  
Used Sand-Blast Machines, "PANG-BORN" latest models, 700#.

CALL US FIRST AND SAVE TIME,  
WE'VE GOT THE GOODS.

ARROW CONTRACTORS  
EQUIPMENT CO.

2020 W. WALNUT STREET  
CHICAGO, ILLINOIS  
PHONE SEELEY 2040

## FOR SALE

- 1—New Kwik-Mix #14 Koebring Bituminous Mixer, 14 cu. feet capacity mounted four pneumatic tires, 30 H.P. Air Cooled engine, tip-over bucket.
- 2—Burners, fuel tank extension track skip to ground with 10' track extension. Immediate delivery priced below market.

AINSLIE CONSTRUCTION CO.  
1935 Euclid Ave., Cleveland 15, Ohio.

## PATENTS—

On Heating Tanks and Nozzle Bar for Road Oil Distributors. Box 101, Roads & Streets, 22 West Maple St., Chicago 10, Ill.



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FOR SECONDARY ROAD  
CONSTRUCTION

**AGGMIXER**



Here's equipment designed especially for mixed-in-place construction — to operate in connection with other general purpose equipment. Whenever aggregates are used it thoroughly pulverizes, mixes and aerates aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. Safe and easy to operate . . . adjustable to any tractor . . . made 4 standard sizes, 4', 5', 6' and 7'. Write for details.

**ARIENS COMPANY**  
BRILLION, WIS.

## 1947 Airport Construction Program

The first year's Federal Aid Airport Program, announced January 11 by T. P. Wright, Administrator of Civil Aeronautics, calls for construction or improvement of 800 airports, at an estimated cost to the Federal Government of \$33,899,665, with local or state government sponsors providing an additional \$37,692,600.

The proposed Federal expenditures include \$26,676,466 from amounts apportioned among the states on an area-population basis as provided in the Federal Airport Act, plus \$6,690,849 assigned to 30 states from a discretionary fund, and \$531,950 from funds apportioned to Alaska, Hawaii and Puerto Rico. After deducting \$2,250,000 for planning, research, and administrative expenses, there will be a balance of \$8,850,733 remaining out of this year's \$45,000,000 appropriation for further allocation.

The program covers only smaller airports (CAA as Class 1, 2 and 3), since the Act requires the CAA to submit to Congress a list of proposed larger airports at least two months in advance of the fiscal year in which they are to receive funds. It was im-

possible to comply with this requirement for the current fiscal year, since the Act had not become law two months before July 1, 1946. In view of these legislative provisions, it is planned that a proportionately larger part of the funds that will be made available by Congress for use in 1948 will be spent on Class IV and larger airports to bring the program into balance.

The 1947 program calls for construction of 232 new Class 1 airports, the type suitable for personal flying; 109 new Class 2 airports (personal flying and local commercial service); 44 new Class 3 fields (smaller transport planes); and three new seaplane bases. Projects for improvement of certain existing airports call for 82 Class 1 fields, 177 Class 2 and 153 Class 3. The Federal expenditure for the improvement of existing and construction of new Class 1 airports totals \$6,539,795; for the improvement of existing and construction of new Class 2 airports totals are \$9,968,958; for the improvement of existing and construction of new Class 3 airports totals are \$17,363,262.

"Every effort has been exerted by careful engineering and close scrutiny of project requests filed to make Federal money go as far as possible toward creating a truly comprehensive national network of airports," the Administrator said. "We, of course, are aware that many deficiencies exist in large terminal airports for air transportation, and we will assist local governments in remedying these just as soon as the law permits and funds are appropriated."

## J. T. L. McNew Passes

J. T. L. McNew, vice-president of Texas A. & M. College, died just before Christmas at age 51. A friend of and teacher of highway engineers

**EMBURY**  
**Luck-E-Lite**  
**HIGHWAY TORCHES**



Always on Guard

Order through Your Jobber  
**EMBURY MFG. CO., WARSAW, N. Y.**

and national leader in engineering education, Col. McNew leaves behind him a brilliant career. He was a graduate of Texas A. & M., where he was a staff member from 1920, having served as an instructor in highway engineering, head of the civil engineering department (1940-45), and since the war school vice-president of engineering.

Col. McNew served in both wars, and recently was a lieutenant in the CBI. He was a vice-president of ASCE and held other honors in the engineering world.

**PORTABLE ASPHALT PLANTS**  
High Production—Low Cost



**THE McCARTER IRON WORKS, INC.**  
NORRISTOWN, PENNA.

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ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

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	Conveyors	

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Kingston, N. Y.

Canadian Representatives: F. H. Hopkins & Co., Ltd.  
340 Canada Cement Co., Montreal, Que., Can.



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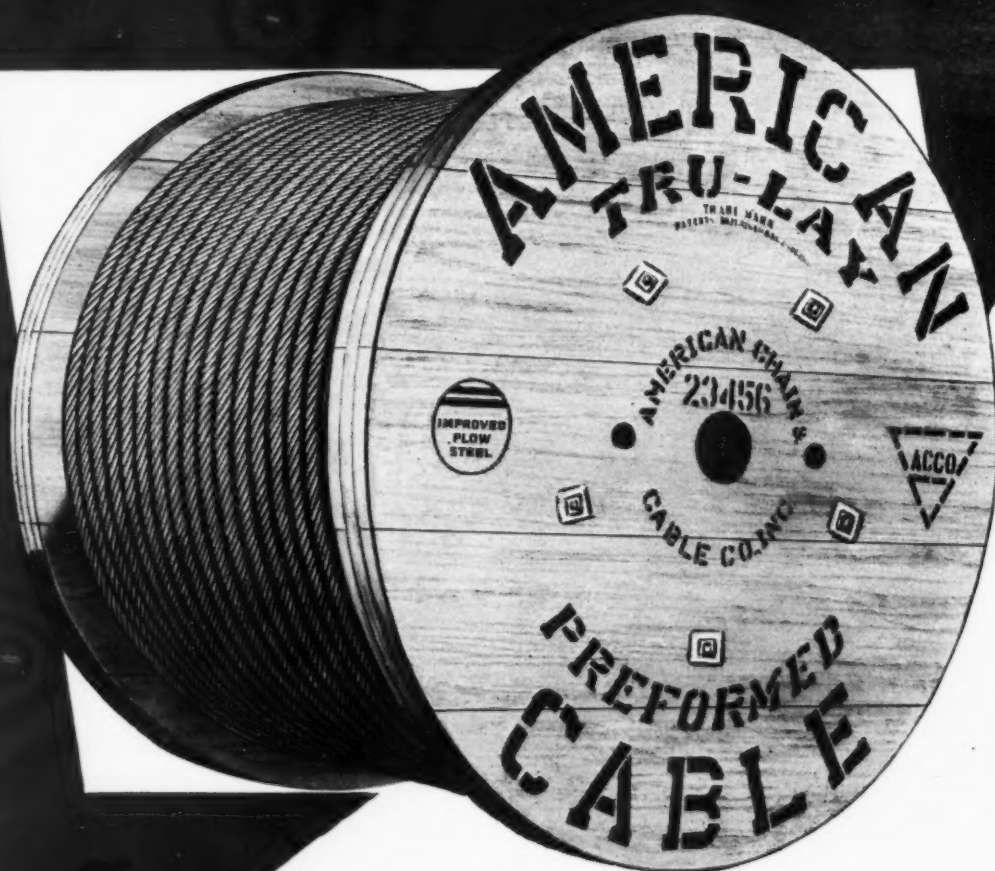
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# TRU-LAY *Preformed*



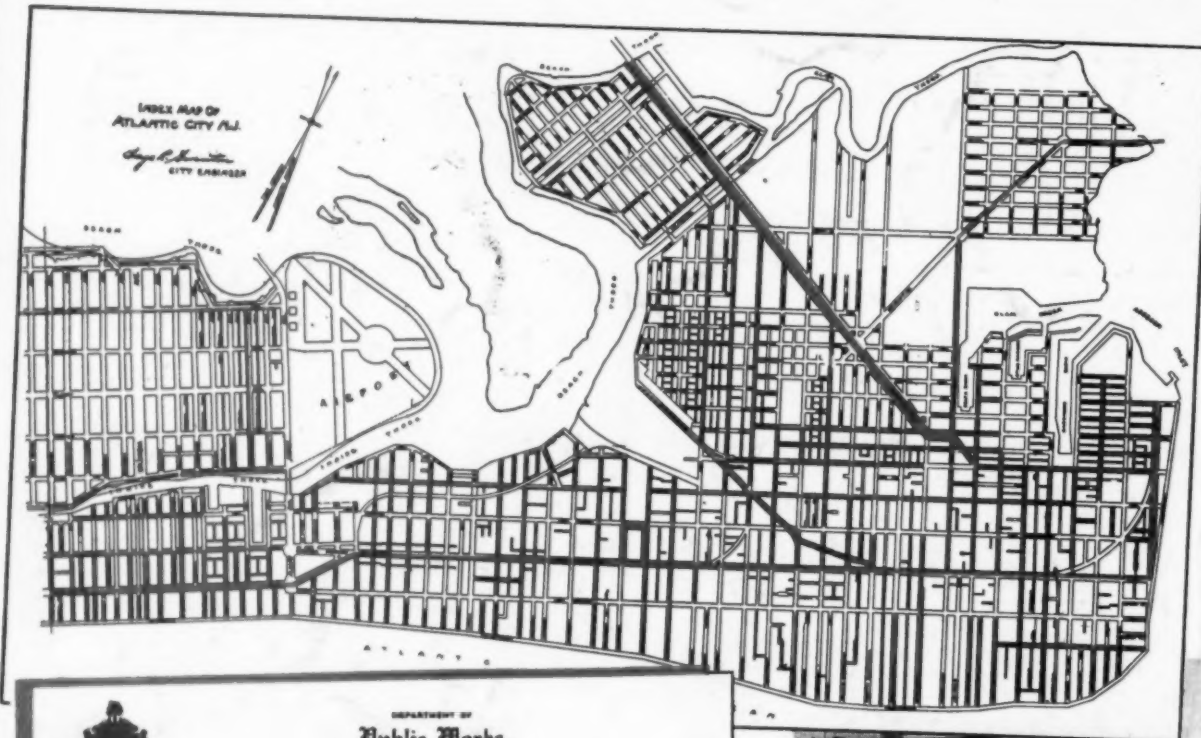
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Operators are proud of what they can do with a clamshell bucket. They like TRU-LAY wire rope for their closing lines because it helps them do a better job. • You might call it "gilt-edge" wire rope . . . this TRU-LAY. It cuts clean without seizing. It takes the reverse bends and will run longer over small sheaves. When wires do break, they don't turn into barbs that will slice a fellow's hand right through his glove. These are the advantages gained by Preforming TRU-LAY. • Add to this the strength provided by the toughest of Improved Plow Steel wires and you get a rope that will stand the gaff. Ask for TRU-LAY Preformed Improved Plow Steel.

AMERICAN CABLE DIVISION  
AMERICAN CHAIN & CABLE



# 88% of ATLANTIC CITY'S paved streets are Texaco



Street map of Atlantic City, N. J., on which streets paved with Texaco Asphalt are indicated in red.



## DEPARTMENT OF Public Works

ATLANTIC CITY, N. J.

MAJOR WILLIAM F. CASEY, COMMISSIONER

July 15, 1946.

The Texas Company  
Asphalt Sales Department  
135 East 42nd Street  
New York City 7

Gentlemen:

This is in answer to your inquiry regarding Atlantic City's experience with Texaco Asphalt paving.

We paved a number of our streets with your asphalt in 1913. As a result of the performance of those early pavements, from the standpoint of durability and maintenance cost, we have added to the original yardage from time to time, up to and including 1946. At the present time, approximately 88 percent of the hard-surfaced streets in Atlantic City are paved with Texaco Asphalt construction of the plant-mixed type. This includes our most heavily travelled thoroughfares, such as Atlantic Avenue and Absecon Boulevard. All of this paving has given satisfactory service.

Atlantic City is visited each year by approximately 12,000,000 people from all parts of the United States. Most of these visitors come by automobile, which gives some idea of the volume of traffic our streets are called upon to serve, particularly during the summer months.

Very truly yours,

MAJOR WM. F. CASEY  
COMMISSIONER.

WFO  
FLA



Atlantic City's principal thoroughfare, Atlantic Avenue, has a plant-mixed Texaco Asphalt pavement.



Atlantic City's principal thoroughfare over the Texaco Asphalt pavement on Absecon Boulevard.

12,000,000 visitors flock to Atlantic City, N. J., every year attracted by its famous boardwalk, bathing beaches and hotels. Less conspicuous to the average visitor, but performing an essential service, are the resort's well-paved streets.

Commissioner William F. Casey supplies some interesting facts concerning Atlantic City's paving in the letter at the left. For example, the resort has been constructing resilient, heavy duty Texaco Asphalt pavements on its streets for 33 years. A glance at the above map of the city's street system reveals at once the extent to which it is Texaco-paved. Approximately 88 per cent of all hard-surface paving in Atlantic City is Texaco Asphalt construction of the plant-mixed type.

Texaco Asphaltic products have served America's road builders for 40 years. Texaco Engineers, who are Asphalt specialists, are at your service.



THE TEXAS COMPANY, ASPHALT SALES DEPT., 135 E. 42nd STREET, NEW YORK, N. Y.  
Boston Chicago Denver Houston Jacksonville Philadelphia Richmond

# TEXACO ASPHALT